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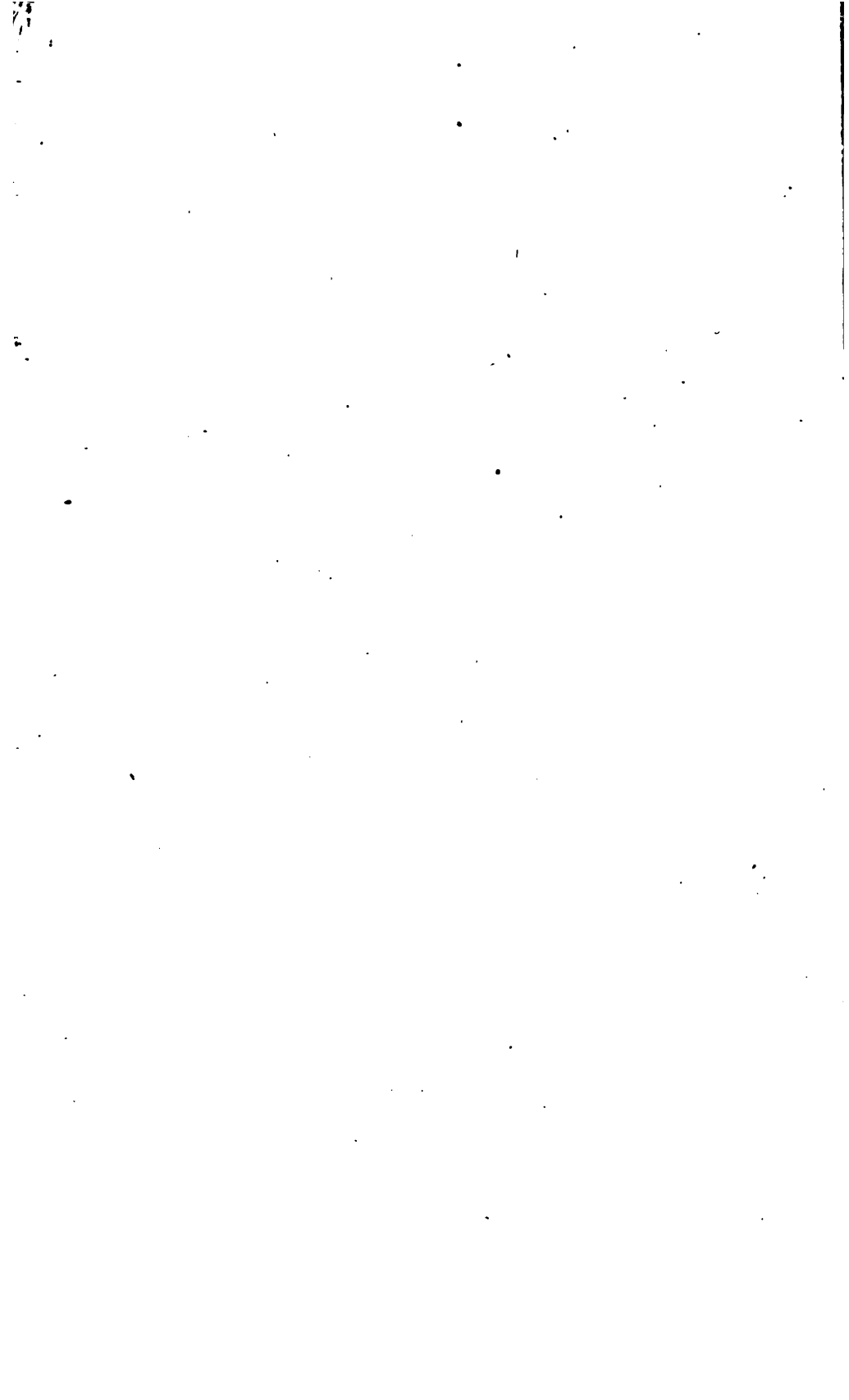
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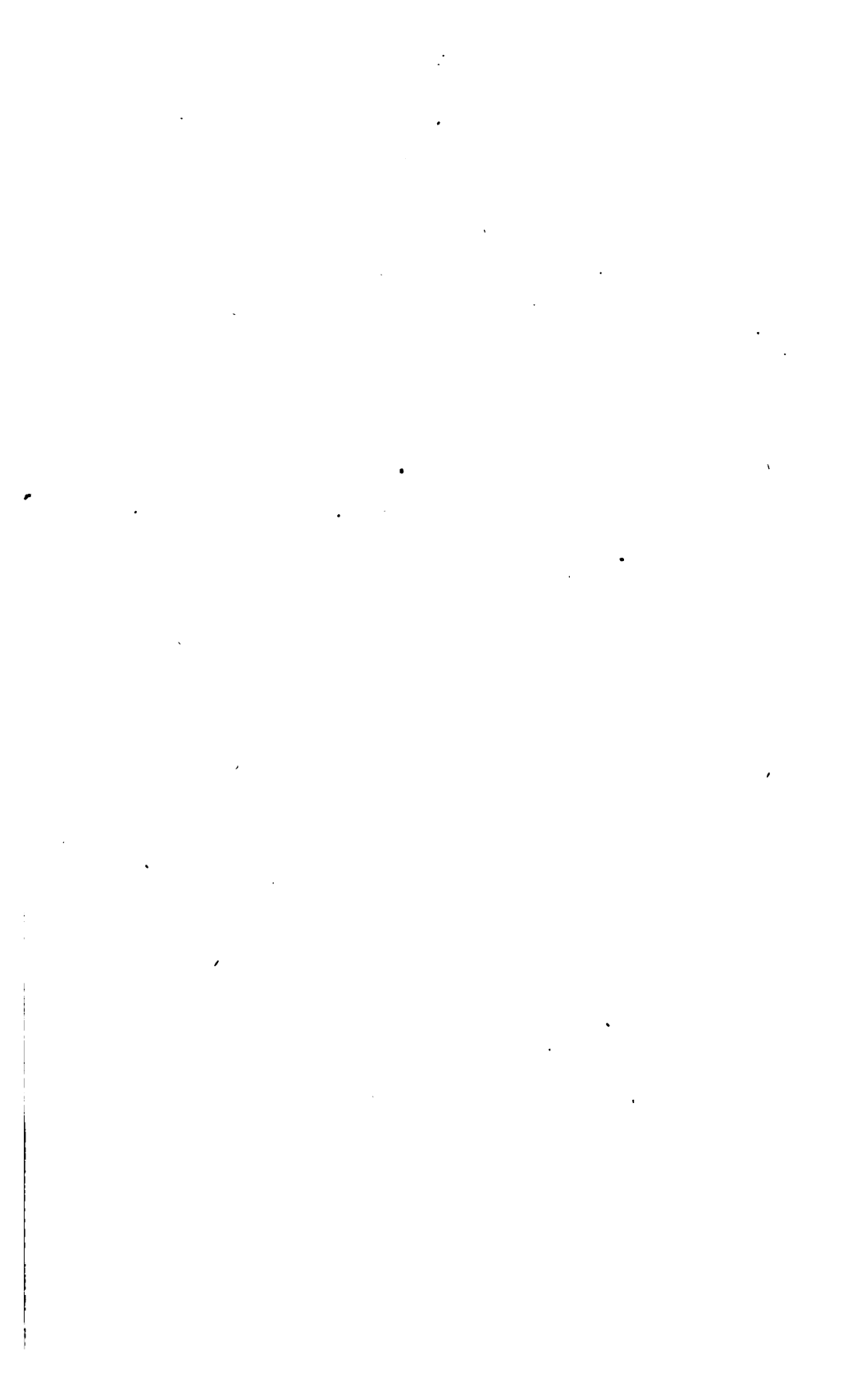
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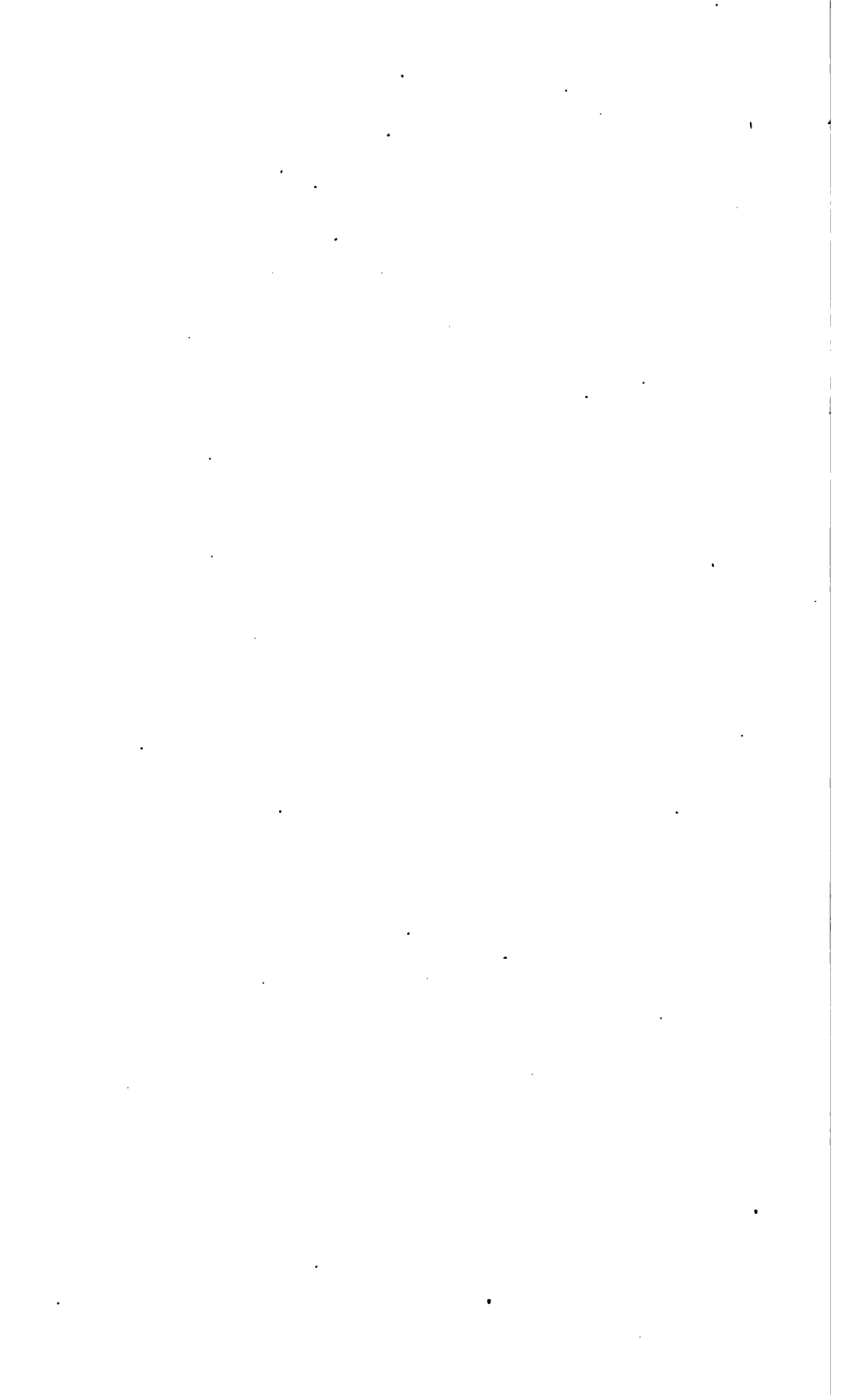
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MASS. STATE BOARD OF HEALTH
JUN 7 1905
ENGINEER'S OFFICE.

HARVARD UNIVERSITY
JUL 18 1944
GRADUATE SCHOOL
OF PUBLIC ADMINISTRATION
MASS. STATE







1868-9.]

CITY DOCUMENT.

[No. 13.]

REPORT

OF A

COMMITTEE OF THE CITY COUNCIL APPOINTED
TO EXAMINE THE SOURCES

OF

WATER SUPPLY

FOR THE

CITY OF PROVIDENCE.

OCTOBER, 1868.



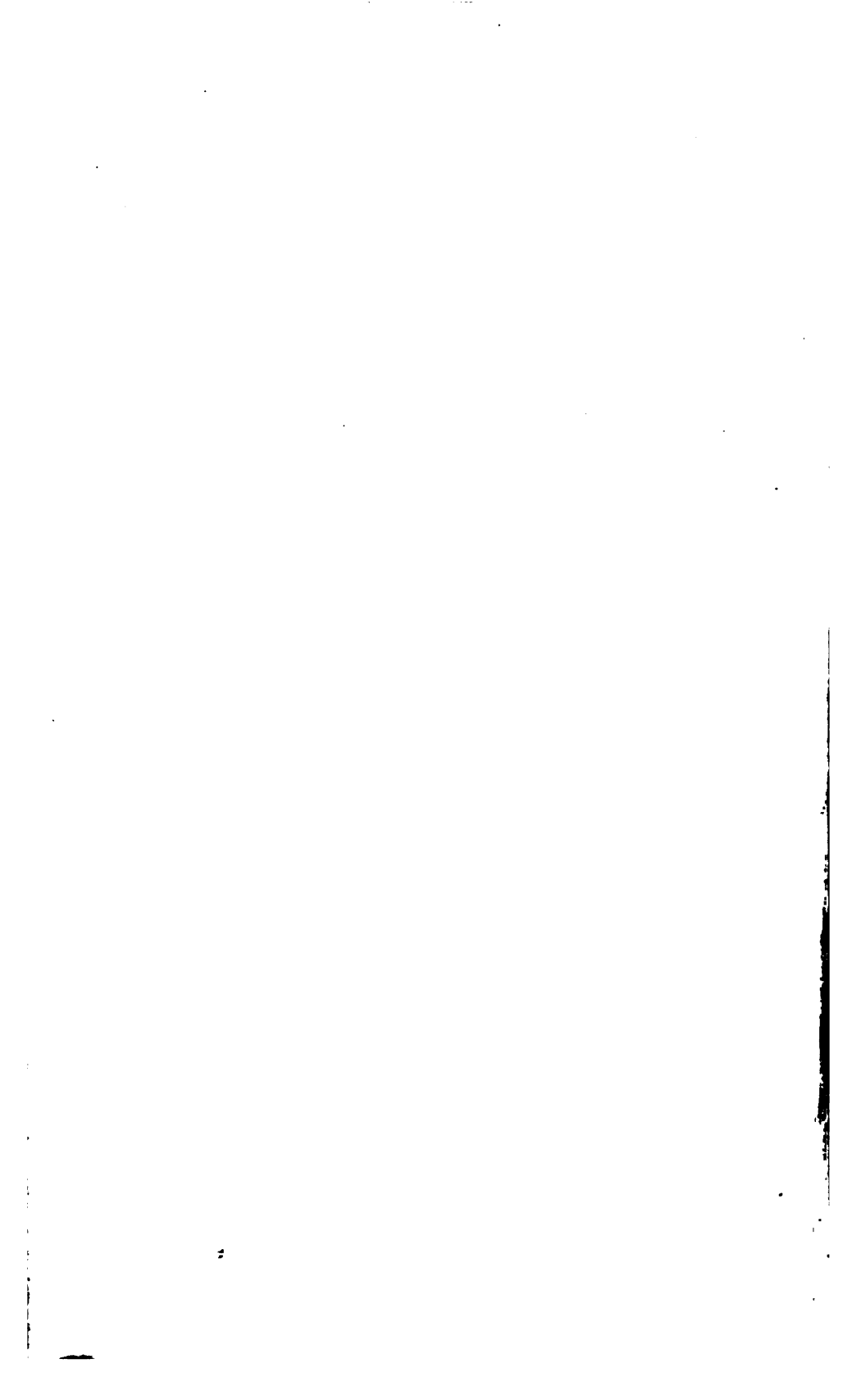
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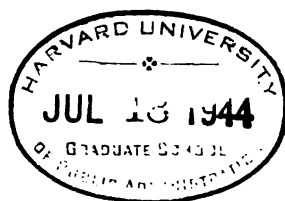
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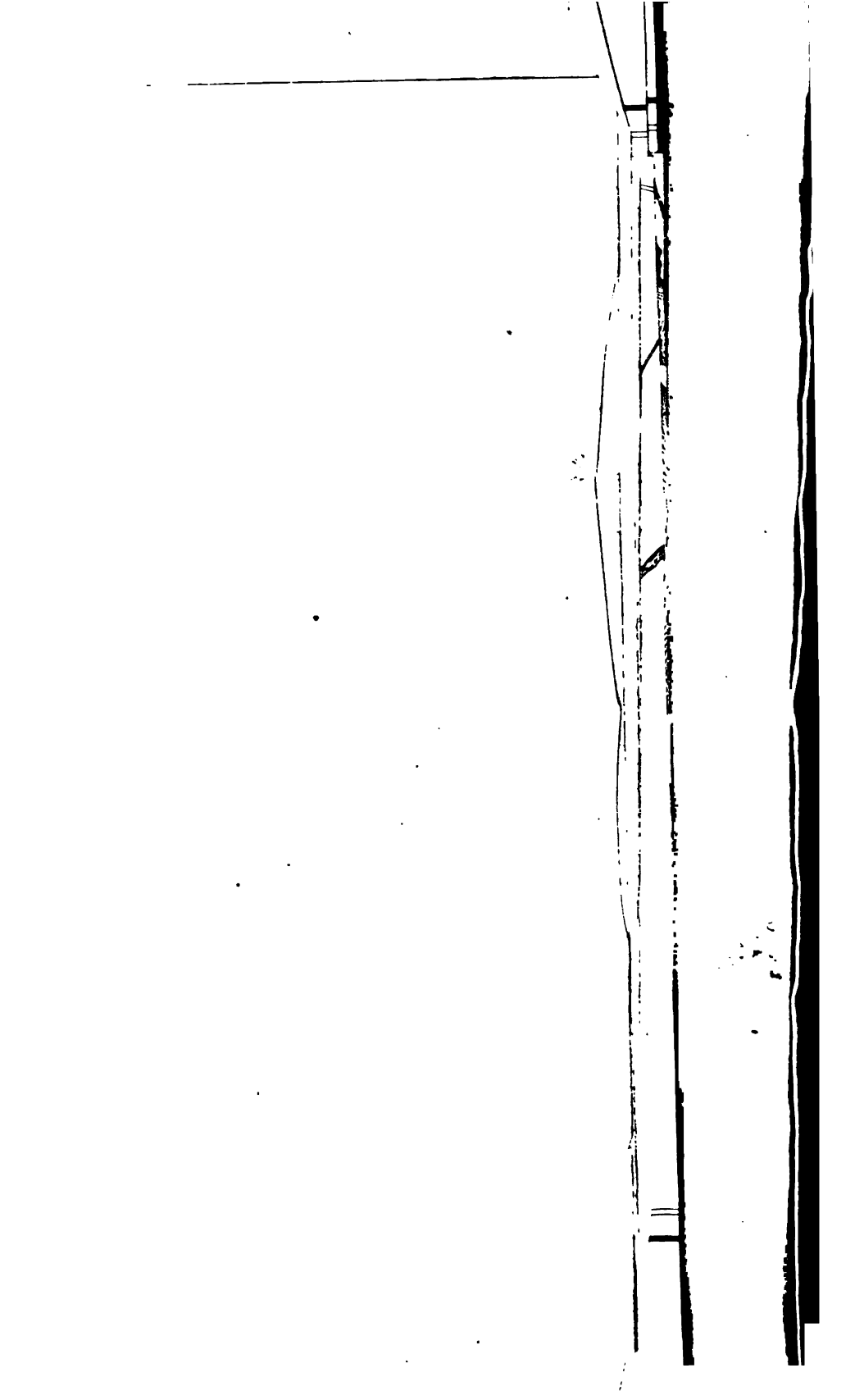
1868.











Dr. Geo. Derby
with the respects of
Herbert Head.

1868-9.]

CITY DOCUMENT.

[No. 13.]

Providence, R.I.

REPORT

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COMMITTEE OF THE CITY COUNCIL APPOINTED TO
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OCTOBER, 1868.



PROVIDENCE:

HAMMOND, ANGELL & CO., PRINTERS TO THE CITY.

1868.

THE CITY OF PROVIDENCE.

RESOLUTION OF THE CITY COUNCIL,

APPROVED JULY 9, 1866.

RESOLVED, That MESSRS. CARPENTER, ARMINGTON, and GLADDING, with ALDERMAN LESTER and the MAYOR, be and they are hereby appointed a Committee to examine and report upon the best sources of obtaining a supply of pure water for the city of Providence, with the estimated cost thereof; with authority to make such surveys and employ such assistance in the discharge of their duty as may be necessary; the expense thereof to be paid out of the appropriation for contingencies.

A true copy. Witness:

SAMUEL W. BROWN, CITY CLERK.

REPORT.

TO THE HONORABLE, THE CITY COUNCIL
OF THE CITY OF PROVIDENCE : —

Appointed a Committee to “ examine and report upon the best source of obtaining a *supply of pure water* for the City of Providence, with the estimated cost thereof,” under a resolution dated July 9, 1866, and having concluded our labors, we hereby report.

More than two years have elapsed since our appointment ; a long period, in view of the urgent need of an abundant supply of pure water to the city. But it should be remembered, that only two months previous, May 9, 1866, a proposition to introduce water was emphatically voted down ; and that, for reasons widely various, plans presented several times during the preceding thirteen years had been rejected.

There had been quite a conflict of opinion since the first proposition, submitted in 1853 ; and the question was thereby forced into peculiar and delicate relations. Many of our fellow-citizens argued that water from without was not needed. Others, unwilling to draw from rivers employed as power, thought that water should not be brought in unless taken from some pond or lake. Others still, looked with suspicion upon one of the rivers named, fearing a scanty supply from it, and apprehensive that somebody would make money through the use of its waters by the city. Some declined to assist in the creation of a water debt, which, it seemed to them, would always remain a burden. Many owners of dwellings in the outer sections of the city, with

wells of fair water upon their premises, were unwilling to be taxed for that which seemed likely to make no adequate return to themselves. No small part of the voters, forgetful of their objections to monopolied corporations as dealers in articles of prime necessity, favored the introduction of water by means of a private corporation rather than by the city.

Now, every Committee of the City Council proposing plans for the introduction of water, and every citizen who had examined the subject, knew that all these objections were, in the main, without weight. Nevertheless, it was necessary that the public mind should be so enlightened as to dispose of all these objections before a vote favorable to the introduction of water could be secured. Surveying, therefore, our field of labor in the important work committed to us, we endeavored to so commence operations as to remove the question beyond the reach of any preconceived ideas; in short, taking it up as though in Providence no attention had ever been given to the subject. Accordingly, we cast about for some engineer, who, while within easy call, might have never known of our plans for water, and in most, if not all respects, a stranger. Correspondence with engineers in Boston and New York finally determined our action; and we engaged the services of one with whom all our intercourse has but served to deepen the conviction of a well-made choice.

Mr. J. Herbert Shedd, of Boston, an engineer of extensive reputation and business in Massachusetts, has served us faithfully. He has not only brought scientific attainments to bear upon the great question, but has made himself so familiar with our city, and its needs in this regard, as to become to all intents a citizen, except in *prejudice*. To him now we respectfully ask your attention. His report is based upon careful examinations and surveys; and so closely have we as a committee, followed in these, that we are convinced the whole matter has been by him practically exhausted.

The work, including maps and a multitude of facts, has cost several thousand dollars; but to the limit of prosecution it is a *finished* work, and will not have to be repeated in the event of water introduction upon any one of the four good plans set forth

We unanimously adopt Mr. Shedd's conclusions, recommending plans in the order specified by him. We further recommend, that, when the question shall be submitted to our fellow-citizens, *the first two plans (Scott's Pond and Pawtuxet) only shall be considered*; the final choice between the two to be made, either by the City Council or by the Commissioners who may be chosen to carry out the work. We take this position, because, in plans of so nearly equal merit, those charged with the duty of construction ought not to be hampered by a vote which would cut them off from the exercise of sound judgment in given contingencies.

We trust, when the question of water shall again be presented for the votes of our tax-payers, it will receive so hearty approval as to show them fully alive to the greatest of their material needs. To reject again the aid of water in abundance, for development and protection, would prove us, as a people, blind to the highest considerations of prosperity, safety, and health. Casting aside every frivolous objection and unworthy prejudice, each should ask himself, why Providence — a city of over sixty thousand inhabitants — should be without a full supply of soft pure water, when every other city of the land numbering thirty thousand inhabitants is either already supplied or has works in progress, except the young city of Milwaukee.

Intercourse with business men, since we entered upon the work assigned, has but served to confirm us in the opinion that our city has been a great loser in being so poorly supplied with water. The Builders' Iron Foundry, for instance, would have taken a contract to cast the "Rodman gun," — a contract calculated to disburse thousands of dollars among our mechanics and laborers, — but for the want of sufficient water to properly cool down the castings; and the agent of the foundry has assured us, that, unless a more liberal supply of water can be had from some source at present beyond his reach, its business capacity must continue but moderately developed.

The Gorham Manufacturing Company have spent a great deal of money in vain attempts to obtain a liberal supply of water for the use of their renowned Silver Works; and so have many other concerns. They have settled wells, and sunk pipes, only

to obtain limited quantities of indifferent water ; and, like the Builders' Foundry, all must be cramped as to growth, until a public supply of water shall have been brought to their aid. How many people realize, that, in addition to the manufactures common to communities like ours, we have branches of manual art quite unknown in most other cities, and that the development of all these adds directly to the wealth of the community ?

What an era in the history of our three hundred and forty-one boilers will it be, when pure water shall be substituted in them for the stuff now used ; when the sound of hammer and chisel chipping away the incrustations shall seldom be heard ; and their attendants shall have confidence in their ability to perform the tasks required without break or explosion !

But there ought to have been many more than three hundred and forty-one boilers in this city when the list was made up for our use ; and water suitable for boilers would have contributed to such result, thereby augmenting population and wealth. •

It is said that the manufactured articles of the city amounted in the year past to more than thirty-three millions of dollars. This is a large sum ; and yet it would have been much larger, had a generous policy in respect to water prevailed in times past.

Though Providence has gained population and wealth since it became the counting-house and workshop of the extensive factory establishments which cluster upon the neighboring streams, it has gained far less than it would, had soft water been abundant during the past fifteen years.

And then what a risk has been taken in regard to fire with our large proportion of wooden buildings ! Good and expensive (made more expensive from the lack of water) as is our fire department, none can tell when a conflagration may occur to sweep away, in a few hours, property costing several times as much as our proposed water-works. The fact of our great exemption from serious fires argues very little against our great liability.

We shall not discuss the question of direct income from the introduction of water. Some cities have received more than enough to pay interest on water debt and all annual cost ; others have not. We can only presume that Providence, from the

character of its business, will be found in the list of those cities whose water-works pay directly. But, suppose such fortune should not follow the construction of water-works here, have not we, as a people, been rapidly educated to regard pure water as an article which will pay indirectly a large percentage?

There are few investments made by the individual, that pay *directly*. Dwellings, furniture, horses, carriages, gardens, and very many things deemed necessary by a cultivated people, do not always, if often, make moneyed returns; and yet thousands justify themselves in the outlay required to possess them.

There are, however, those so well convinced of the profitable nature of the investment required to furnish our city with water that they have already petitioned the General Assembly of the State for an Act of Incorporation. This petition would undoubtedly have been granted at the last session of the Assembly, had not your committee represented the importance of allowing the people of Providence to first say whether they would prefer works constructed at public cost.

As a committee, we have always kept steadily in view the fact that most water companies have constructed their works on a scale too small for the demand soon made, and that the people have in such cases often called upon their representatives to become the purchasers for them, and largely to reconstruct. Reconstruction is generally expensive and wasteful; and the people have been led to wish they had built such works themselves, instead of permitting private parties to do it. Our engineer has argued this point in his report.

We are called upon from the character of our subject to refer you to the analyses of water obtained from various wells and "fountains" in the city, as made by that careful chemist, Prof. J. H. Appleton, of Brown University. His Report, appended, contains several interesting facts, to one of which we desire here to ask your notice. He considers that water containing more than 25 grains of solid matter in a gallon can hardly be called more than of fair quality for domestic use; and yet one of the "fountains" has deteriorated to that extent during the past fifteen years, its analysis in 1853 showing about 10 grains, and, in 1868, over 36 grains. It is fair to presume that a large proportion of

the water beneath our feet has deteriorated in like degree during the same period of time.

What we have written is necessarily a kind of preface to the more elaborate and exact statements of one whose knowledge of the subject under consideration is thorough and practical. In this *preface*, we have aimed to discuss only those bearings of the subject which Mr. Shedd has purposely omitted, as not belonging so properly to his department as an engineer, as to ours, a committee. Whenever we have stepped upon ground occupied by him, it has been simply to assist, if possible, the fortifying of his position in its relation to Providence.

But we conclude, and, in so doing, again ask your most careful attention, and, through you, of all the good people of our city, to the main body of our work.

Respectfully submitted,

CHARLES E. CARPENTER.

JAMES H. ARMINGTON.

BENJAMIN C. GLADDING.

JOHN K. LESTER.

THOMAS A. DOYLE.

REPORT.

*To the Committee of the City Council on a Supply of Pure Water
for the City of Providence.*

GENTLEMEN:—

IN submitting the following Report on means of supplying the City of Providence with water, it may be proper to recall the circumstances and instructions under which my investigation has been made.

In the month of October, 1866, I was called upon by you to make a professional examination of all possible sources of supply, with the distinct understanding that this examination should be entirely independent of all previous investigations and reports. To this end I was kept in ignorance of what had been done in the past, and you have carefully refrained from giving me your impressions, if any you have, for or against any particular plan. I have thus been left free to consider the various possible plans in purely scientific light, without personal prejudice from any source.

The nature of the examination required was such as to embrace all the important facts regarding all practicable sources of supply, so that the city authorities and the people might be in a position to judge for themselves as to their respective merits, and so that no future investigations of this kind should be necessary. I was directed to spare no needful pains or expense for this purpose, and to make whatever preliminary sur-

veys were required to develop what I should find to be practicable sources of supply, with such accuracy and thoroughness that the same ground would not have to be gone over again in the event of the adoption of either plan.

In obedience to these instructions, I made a personal examination of the following ponds and streams, including all of any considerable size within reasonable distance of the city: Mashapaug Pond, Scott's Pond, Olney's or Stump-Hill Pond, Carr's Pond, Moswansicut Reservoir, Wallum Pond, Stillwater Reservoir, Abbott's Run, Moshassuck River, Woonasquatucket River, Seekonk River, Ten-Mile River, Blackstone River through Scott's Pond, and at Pawtucket, and Pawtuxet River. I have reviewed with some care the whole subject of water supply in its various aspects of quantity, quality, economy, and possible sources, including the examination of Artesian wells. I have had all necessary surveys made for the projection of plans for supplying the city from Seekonk River, Ten-Mile River, Blackstone River, through Scott's Pond, and at Pawtucket, and the Pawtuxet River; and finally, I have prepared detailed plans, with estimates, for a supply from Blackstone River through Scott's Pond from the Blackstone at Pawtucket, from Ten-Mile River, and from the Pawtuxet River. The surveys have been executed and the drawings made mostly by my assistant, Mr. Otis F. Clapp, whose habitual accuracy and faithfulness make them worthy of entire confidence. Much of the labor of preparing plans for the construction of the works, including a large amount of calculation, has been performed for me by Mr. Hiram F. Mills, Hydraulic Engineer, to whom I am also indebted for his valuable co-operation in the general study of the whole matter.

To present all the information obtained, and all the facts that have been taken into account in forming my judgment on the several points, would make a report much too extended for popular use. It is, therefore, thought best to present in this report a general view of the whole subject, with so many of the particular facts involved as seem necessary to enable the reader to form an intelligent judgment for himself as to the comparative advantages of the different plans described.

QUANTITY.

It is presumed that the city of Providence will not undertake, with the public money, the construction of water-works for a less supply than that of the entire city, including all purposes of consumption, with the probable increase for a considerable period. These purposes may be classed as those of—

THE HOUSEHOLD,
MANUFACTURES,
EXTINGUISHING FIRES,
PUBLIC FOUNTAINS AND BATHS.

Of these purposes the household, though most immediately affecting each individual, might be left most safely to private effort; for a sufficient supply for family use, of tolerable quality, can always be obtained by some means or other. But the more public uses require the joint action of the whole community, and are of such magnitude as to exceed all ordinary, minor means of supply. The most imperative of these is that of water for extinguishing fires. With forty or fifty million dollars worth of property at stake, ordinary business sagacity would deem it essential to have the means of extinguishing fires everywhere ready at hand in abundance. What would be proper prudence for individuals is not less so for the community. Of course, the greater and more efficient the protection is, the greater the value of such property.

A similar exercise of prudent and wise forethought would make it seem incumbent upon the community to provide necessary facilities for the manufacturing interest, in order to encourage its development within the city limits. And this interest, in several important branches, is dependent for success on a copious supply of pure water. Public fountains, and ample facilities for bathing, may be reckoned among the luxuries that follow the introduction of water into a city at the public expense. But their value is not the less certain in promoting the public welfare.

When public necessities seem to demand a public supply of water, private convenience may be recognized as a very urgent

claimant in addition. Those who have once had the favor of an unlimited supply of pure, soft water, running at their hand by the turning of a faucet, would not willingly incur again the inconvenience and expensive labor which attend the pumping of their daily supply from a well, — even were it possible, which is not the case in Providence, to procure well-water of equal quality. In fact, the actual expense of pumping, by manual labor, the water now used for domestic purposes in the city of Providence exceeds, by calculation, the cost of pumping by steam-power twenty times the quantity, from any neighboring river level, to a proper height for the city reservoir.

In considering, therefore, the *quantity* of water to be supplied to the city of Providence, besides reckoning liberally for public uses, we may fairly presume on the inhabitants not being slow to avail themselves of the new privilege; and so make our calculations for an abundant supply for all private uses, equal to what is used in other cities in proportion to the population.

The amount of water daily consumed by a family is quite variable. Where it has been actually measured, it has been found to range, in families of similar class, from eight to forty gallons for each person. Experiments in the families of the Boston Water-Board indicate twenty-five gallons a day, as a sufficient supply. Twenty years ago water-works for large cities were constructed on a basis of twenty gallons to a person, for total supply. But these works have proved quite inadequate to the demand upon them, and have had to be largely increased. In fact, it has generally been found, that, whatever the quantity of water estimated to be required at the time works are begun, the quantity actually used is largely in excess.

According to the published reports, the average daily consumption in Boston in 1861, for all purposes, was $100\frac{2}{3}$ gallons for each inhabitant. Since that time efforts have been made to reduce waste, with such success that the amount used in 1866 was $61\frac{1}{3}$ gallons for each person. And the City Engineer believes that the rate of forty gallons a person would be an ample supply for all purposes, if properly used. The quantity originally estimated to be required for Boston was $28\frac{1}{2}$ gallons a person. * In New York, the quantity now distributed averages fifty-five millions of gallons a day. On the supposition of one million inhabi-

tants, this is fifty-five gallons to each. Taking the experience of Boston as a guide for determining the amount that would be required in Providence, the following tables will assist in arriving at the result. The population of Boston is taken at 192,324 and that of Providence at 54,594, in accordance with the census of 1865. The quantities of water used are those of 1866. And the assumption is, that the various establishments pay for their water used, in due proportion. This may not be strictly true; but it is the most correct guide that we have, and is sufficiently exact for our present purpose. The quantity of water used in 1866, was less than in any other year since 1856, and more than ten per cent less than was used in the following year, 1867.

Average daily quantity of water used in Boston, 12,229,000 gals. Of this amount, there was sold by meter (at 3 cts.

per 100 gallons), 1,070,728 "

Leaving average daily quantity of unmetered water, 11,158,272 "

For which was paid \$342,128.00, or at the rate of three cents per year for one gallon per day, or about four-fifths of a cent per one hundred gallons.

The unmeasured water was distributed in Boston as shown in the following table:—

QUANTITY OF WATER USED IN BOSTON.

No. of establishments supplied with Cochituate water.	Amount of water-rates paid.	Daily quantity of water used.	Proportionate no. of gals. for each estab'mt.
19,720 dwellings	\$246,603	8,220,100	417
4,457 stores and shops	39,867	1,328,900	298
5 hotels	412	13,733	2,747
335 restaurants and saloons	4,142	138,067	412
412 offices	3,240	108,000	262
1,020 stables	7,512	250,400	245
5 green-houses	47	1,567	313
64 churches	688	22,933	358
302 schools	2,117	70,567	234
36 printing-offices	524	17,467	485
50 steamboats	9,650	321,667	6,433
12 breweries	39	1,300	650
67 bakeries	557	18,567	277
45 photographers	1,249	41,633	925
Sundry establishments . . . . .	.....	603,371	

Total daily consumption of unmeasured water 11,158,272 gallons.

Applying the foregoing rates to the establishments reported by the authorities in the city of Providence, in 1867, we have the following results : —

QUANTITY OF WATER REQUIRED FOR PROVIDENCE.

No. of establishments reported in the city of Providence, in 1867.	No. of gals. required for each establishment.	Total number of gals. required daily for each class of establishments in 1867.
6,981 dwellings.....	417	2,911,077
1,793 stores and shops.....	298	534,314
16 hotels.....	2,747	43,952
156 restaurants and saloons.....	412	64,272
642 offices.....	262	168,204
657 stables.....	245	160,965
57 green-houses.....	313	17,841
53 churches.....	358	18,974
27 school-houses.....	234	6,318
8 printing-offices.....	485	3,880
26 steamboats.....	6,433	167,258
3 breweries and distilleries....	650	1,950
11 bakeries.....	277	3,047
14 photographers.....	925	12,950
Sundry establishments in proportion to population, after deducting the amount used for the purposes specified below.....		91,631
Proportionate quantity of measured water.....		304,087
Add for special uses, as estimated by city officers, as follows : —		
Daily quantity required by steam boilers.....		444,782
“ “ “ for fire department.....		30,000
“ “ “ for building purposes.....		100,000
Total estimated daily average quantity required by the city in 1867.....		5,085,502

From the above calculation, which, though the data are necessarily somewhat uncertain, is the most reliable that can be obtained, it will be seen how unreliable are estimates based, as is usually done, on the simple numbers of the population. The unusual proportion of manufactures and of steam-boilers in Providence brings its required amount of water for each inhabitant nearly 50 per cent higher than that in Boston; that is, according to the above table, 93.15 gallons a day, under strict economy.

It should be remarked that in 1866, which year is used as the basis for this estimate, water was used in Boston with unusual care ; and that in previous years, when the inhabitants used the water freely, the quantity consumed was nearly fifty per cent greater than the quantity used in 1866. Increase by fifty per cent the part of the foregoing estimate which is based upon the careful use of the water, that it may agree with the ordinary practice in Boston, and we have seven million one hundred and eighty-eight thousand eight hundred and eighteen (7,188,818) gallons required to supply the present supposed demands, or about 120 gallons to each person.

I assume that the works should be constructed on a scale to supply twelve million gallons daily, to provide for the anticipated growth in the next twenty years, with facilities for a large increase at a later day. At the estimated demand, twelve million gallons will supply about one hundred thousand persons ; but, with the strictest economy in the use of water, the future increase in the capacity of the works may perhaps be postponed until the population shall reach two hundred thousand. It may be thought that the estimates of quantities required are too liberal, and that they should be based on the experience of some other cities, where a less quantity is used than in Boston ; but the character and habits of the citizens of Providence seem to me to accord more nearly with those of Boston than of any other large city ; and I suppose the citizens will prefer to sustain larger works rather than submit to the constant oversight of police and inspectors, upon their premises, to see that the water is not wasted. I am also governed somewhat by the fact that I have yet to learn of the first instance in which the estimated requirements of a city have equalled the actual demand. By the general use of meters, the daily quantity required may be materially lessened ; but, though there is reason to believe that some available meter will soon be devised, it is taking the safer course to supply all the water that may be required, if such meters are not found, or not used. It will be unnecessary to construct at first all the works which have been planned and included in the estimates, from the fact that some time may elapse before the entire population will avail themselves of the water.

QUALITY.

The instructions of the City Council to the Committee, and of the Committee to their Engineer, are to report on the best source of obtaining a supply of *pure water*. This demand for *pure water* rests on the universal understanding, that, the purer water is, the better fitted it is for common use. Exceptionally, waters impregnated with various mineral elements have important uses, particularly as remedies for disorders. It is even held by some, that, for common drinking, a slight trace of certain mineral salts, or of organic vegetable matter, makes water more wholesome than that which is perfectly pure. Indeed, the presence of carbonic acid and air in water fresh drawn from a spring gives a life to it that makes it more agreeable to drink than boiled or distilled water.

But even if it should be a fact, which we cannot assume, that any other than chemically pure water is the most wholesome, there is no question, that, for general manufacturing purposes, the greatest possible degree of purity is desirable, and that this is the safest standard for us to aim at for household use as well. For bleaching purposes, for dyeing, and for manufacturing chemicals, the importance of pure water is such as to control the location of their establishments, and give great advantage to those which are most successful in obtaining it. For steam-boilers, the importance is too well known to need mention.

In household economy, besides the question of what is agreeable and wholesome to drink, and of what is easy to wash with, it is important to consider that the waste of materials which it is desired to infuse, or dissolve, such as tea, coffee, soap, &c., is very great in hard water. The effect of hardness, or the presence of lime, in water, is well understood as increasing the difficulty of washing with it; but the actual waste of soap in hard water is greater than may be supposed. A certain quantity is expended in neutralizing the lime before the soap will dissolve freely, and make a lather. The loss is ten grains of soap to one grain of lime. One grain of lime in an Imperial gallon of water, is called 1° of hardness. In water,

then, from the softest well analyzed by Prof. Appleton, of 4.30° hardness, about 50 grains of soap must be wasted in each gallon of water; and in that from the hardest well, of 22° hardness, 220 grains.

At the Bolton-Union Workhouse, England, about \$5 a week, or about half the former cost, was saved in soap by changing from water of 5° to water of 2° hardness,—that is, from water similar to the softest well-water in Providence, tested by Prof. Appleton, to water similar to that of either of the neighboring rivers. Taking the English experiments of Prof. Clark and Mr. Donaldson, and assuming that each family in Providence uses, from the wells, only five gallons of water per day for purposes requiring the use of soap, and that the saving in the city by substituting river water for well water, would be equal to the difference between the average hardness of the well waters and river waters as ascertained by Prof. Appleton, we should have an annual saving of \$42,000, to the citizens in the item of soap alone, by the public supply of river water. Writers upon this subject say the saving of wear and tear of clothes is fully equal to the saving of soap. In the making of tea and other infusions of costly material, the loss is very great, from the fact that hard water will not readily absorb the flavor. Mr. Soyer concludes, from his experiments, that the same quantity of tea will make five cups with soft water, and but three cups with hard water. He also finds great difference in favor of soft water, in the cooking of vegetables and meats, where it is desired to soften them, or to abstract their juices.

No doubt the unsatisfactory quality of the well-water in use in Providence and its vicinity is as important a reason for a new supply, as the want of a more abundant quantity, or of greater ease in obtaining it.

Of the 3,143 wells in the city of Providence, 599 are reported bad or indifferent; while only 356 are soft; and the remainder, 2,787, are hard and not used for washing. That not quite one in five is reported bad or indifferent to drink, while more than seven in eight are too hard for washing, is probably owing to the fact that persons become so accustomed to the taste of the water they are in the habit of using, as not to notice its peculiarity of

flavor, unless some opportunity occurs for comparison with pure water. And then it not unfrequently happens that the accustomed impure water is preferred, at first, to that which is every way purer and better.

In the accompanying report by Prof. Appleton, is shown the degree of impurity and hardness of twenty-four specimens of water from various wells in the city, selected from among those generally reported good. The results are given for Imperial gallons; but, for the purpose of comparison with other tables, I have reduced them to the American standard gallon of 231 cubic inches. The very best specimen shows over eleven grains of impurity in a gallon of water. And the softest shows nearly five degrees of hardness. While the poorest specimen shows over eighty-one grains of impurity in a gallon, and twenty-two degrees of hardness. The average of the specimens tested shows about thirty-three grains of impurity and about eleven degrees of hardness. Another table in Prof. Appleton's report shows, in contrast, the comparative purity of various rivers about the city. From this it appears that the greatest amount of impurity in these sources of supply, in Ten-Mile River, is 2.74 grains in a gallon; and the least, in Pawtuxet River, averages 2.14 grains. The highest degree of hardness is found in Ten-Mile River, 0.88 of one degree. The lowest degree of hardness, 0.88 of one degree, is found in the Pawtuxet River.

In the following table may be seen the relative hardness and impurity of such wells in other places as we find reported:—

TABLE SHOWING THE QUALITY OF VARIOUS WELL-WATERS.

LOCATION.	GRAINS IN WINE-GALLON.	HARDNESS.	BY WHOM ANALYZED.
Hartford 1	43.60	10°55	Prof. Silliman, jun., 1861.
" 2	32.16	13°44*	B. W. Bull, 1847.
" 3	19.33	8°39*	" " "
" 4	37.10	"	" " "
" 5	69.05	19°22*	" " "
Charlestown,	26.40		Dr. A. A. Hayes, 1851.
Detroit,	116.46		Prof. S. H. Douglass, 1854.
Manhattan, N. Y.,	104.00		
Average of several others,	49.00		
Albany, Lydius st.,	19.24		
" av. of several,	48.69		

* Hardness ascertained by Prof. Silliman, jun., in 1861.

LOCATION.	GRAINS IN WINE-GALLON.	HARDNESS.	BY WHOM ANALYZED.
Albany, Capital Park,	65.20		
Indianapolis,	60.00		
New Haven, av. of five,	20.32		
Brooklyn, av. several,	48.83		
Boston, Longacre,	56.80		
“ Beacon Hill,	50.00		
“ av. of three,	44.46		
“ Tremont st.,	26.60		
Rochester, av. of several,	30.00		
Washington, av. of nine,	16.00		

The following table gives the comparative purity of various river and pond waters used or proposed to be used by cities.

TABLE OF COMPARATIVE PURITY OF DIFFERENT RIVER AND POND-WATERS.

SOURCE.	SUPPLIED TO OR PROPOSED FOR.	GRAINS SOLID MATTER IN WINE GALL.	BY WHOM ANALYZED.
Connecticut River,	Hartford,	2.56	Prof. Silliman, 1861
Lake Cochituate,	Boston,	3.37	“ “ 1845
Schuylkill River,	Philadelphia,	5.50	“ “ “
Croton “	New York,	10.60	“ “ “
Mystic Pond,	Charlestown,	4.08	Dr. A. A. Hayes 1859
“ “	“	3.22	Prof. Silliman, 1862
Lake Michigan,	Chicago,	8.01	
Jamaica Pond,	Brooklyn,	4.40	“ A. K. Eaton, 1859
St. Charles River,	Quebec, (av.)	6.75	“ Silliman, 1848
Patron's Creek,	Albany,	4.72	
Hudson River,	“	7.24	
Passaic “	Jersey City,	7.44	
Jones's Falls,	Baltimore,	5.85	1860
Potomac River,	Washington,	5.59	1859
Genesee “	Rochester,	11.21	1860
Lake Ontario,	“	4.16	1859
Burlington Bay,	Hamilton, C. W.	7.03	
Ohio River,	Cincinnati,	6.74	J. M. Locke, 1853
Detroit “	Detroit,	5.72	Prof. Douglass, 1854
Mill “	New Haven,	4.00	
Pine “	“	5.60	
Fresh Pond,	Cambridge,	6.32	
Ottawa and St. Lawrence,	Montreal,	7.04	
Mohawk,	Troy,	7.88	
Pawtuxet,	Providence,	2.14 av.	Prof. Appleton, 1868

From these tables it appears that the average amount of impurity in the well water of which we have analyses is about forty

grains in a gallon ; while that of river and pond water is about six grains, or less than one-sixth the proportion in well water.

It may be a matter of surprise to some that river water, so entirely open and exposed to drainage and other sources of impurity, should be found so pure, in comparison with well water, which is supposed to be too deep for any such additions. But, in truth, the amount of decaying vegetable and animal matter that is carried down into wells from leaky vaults, cesspools, drains, &c., is very great, in addition to the decomposing mineral matter that is taken up by the water from the strata of rock and earth through which it flows. This addition of animal and vegetable matter increases largely with the density of population, and is greatest in towns and cities that have not a public supply of water, because in such there is less necessity, less care, and less facility for ample drainage. It is not the least of the advantages of a liberal supply of flowing water that it becomes the means of washing away at once from dwellings the sewerage, much of which is otherwise left to sink away gradually from vaults and cesspools, the denser portions being removed from time to time with great inconvenience after poisoning the surrounding air with its effluvia. The percolations from these cesspools and vaults of privies, spreading year by year over larger circles of the subsoil, have invariably, sooner or later, reached the water of the wells from which the inhabitants receive their daily drink ; and doubtless have been long injurious to health before they have become distinctly perceptible or offensive to the taste. The soil, under this system, becomes after a while saturated for a considerable depth with the impurities incident to human life ; the rain-water, upon which all wells depend for their current supplies, necessarily reaches these wells after passing through more or less of this earth saturated with such impurities, and imbibes in its course a portion of their poisonous qualities. These results are slowly believed in, and are often suffered to generate malignant forms of disease before being admitted.

It is a common experience, that wells, at first soft, gradually become hard, and often obnoxious to smell and taste. But the fact is seldom realized that this change is owing to the penetration into the well of surface water charged with household

waste. On the other hand, where ever so small a quantity of decaying matter is *seen* to enter water, it is difficult to rid the imagination of the idea that the whole water becomes impure. Thus rivers, where some amount of filth is known to be added to their waters, are often supposed to be more foul than wells into which there may be, in proportion to their quantity of water, a thousand times more impurity percolating out of sight.

Rivers, besides their advantage in the immense proportion of water to the added impurities, at points where they would be used, have the very important function of ridding their waters, in a great measure, of the additions they receive, by their continual motion, which tends to dissolve the decomposing matters in the air when volatile, or, by the oxidizing effect of contact with the air, to favor their dispersion.

As an illustration of the rapidity of this effect of motion, Dr. A. S. Taylor testified before a committee of Parliament, in London, as quoted by Mr. Chesbrough, Chicago Report, that he and Professor Cooper put about half a teaspoonful of "hydro-sulphuret of ammonia, the most fetid liquid that chemists are acquainted with," and the foulest that flows from privies, into a bottle of water containing some fifty ounces. After shaking, the liquid was covered over and allowed to settle twenty-four hours; after which no smell of sulphur remained, and Professor Cooper drank a quantity of the water. Dr. Taylor further testifies that in running-water organic substances "are very rapidly decomposed and destroyed; the nitrogen is converted into nitric acid; the sulphur is converted into sulphuric acid; so that these fetid and putrid substances which go into the Thames from London, when rolled about by the action of the water containing an enormous amount of air, are all oxidized and destroyed: within a certain limit they may be found; but still, after a very short passage, they are very soon indeed destroyed." "I believe it is the opinion of every chemist who has considered the subject, that sewage-matter does not remain as sewage-matter in well-aerated water; but that all phosphorus, sulphur, and nitrogen are speedily destroyed by the oxygen in that water. Every thousand gallons of water will contain forty-six gallons of oxygen, and that oxygen destroys all such putrescent effluvia." Sewage matter,

"with water not exposed to the air, and not containing air," "is most offensive and unwholesome ; but with water containing air like the Thames, and exposing an enormous surface to the air in its daily motion, the effect is to completely obliterate every trace that a chemist can detect." "In the Thames, and other water, the air is in a state of solution, the matter in a state of diffusion, and thus the air and this fetid matter are in the very condition to combine together and form an innoxious compound : *it requires time and motion*, but still it does take place with very extraordinary rapidity." "By the time the water has passed six or eight miles, according to the wind and other circumstances, you have a complete decomposition of it," — the sewage matter of London.

Dams and water-wheels are a means of aerating the water of rivers about Providence, and it may be presumed that these rivers naturally contain as much air as the Thames.

Dr. Taylor gave an illustration of decomposition as follows : "When manure is put upon a cucumber-bed, it is not the offensive or putrefying matter which goes into the cucumber or melon, but there is a chemistry going on, by which the elements of animal matter are converted into new substances, and go into the vegetable in a different state ; there is a process of oxidation and incorporation. And a similar process takes place upon the mixture of the sewage-matter with the water, but to a much greater extent."

It is in the process of decomposition that organic matter is offensive to taste and smell. When the process is completed some of the elements are volatilized and escape into the air, while others are precipitated as salts, in new combinations, to the bottom of the water. Even the turbidness of rivers has its advantage in furnishing a coarser material that entangles and gathers the finer impurities, so that after settling, or filtering, the water will be all the purer and brighter. "The more turbid the water is, the quicker, in my experience, will it clear itself." [J. T. Cooper, testimony before committee of Parliament.] The effect is analogous to that of settling coffee by the addition of egg or fish-skin.

But, whatever water is taken, it is not necessary to deliver it in the same condition in which it is drawn from its source.

In the first place, it should be allowed opportunity to settle in a still basin, or reservoir, when a large proportion of whatever suspended matter may be in it will subside. After this subsidence, it is not uncommon in other countries, if waters of much impurity are used, to make them pass through filter-beds, constructed mostly of sand and gravel. The effects of this filtration are greater than might be supposed. It has been found, by careful experiment, that such filters remove from the water nearly all the suspended matter, a portion of the organic matter in solution, and even a considerable proportion, varying with the degree of impurity, of the soluble salts. In regard to any of the waters recommended for the supply of the city of Providence, the amount of soluble matter in them is so very small, so much less than in the best of wells, that it would seem to be superfluous to filter them for the sake of reducing this amount. And, so far as practical utility is concerned, the same may be said of separating the small amount of suspended matter left after passing the settling basin. But, in case extraordinary purity should be desired, the plans submitted embrace provision for filtration which may be adopted or not at pleasure.

A filter bed ordinarily contains sufficient area to pass all the water required through the filter at a rate of from seventy-five to one hundred gallons a square foot in twenty-four hours. This, for the quantity proposed for Providence, would be from two and three-fourths to three and two-thirds acres. For water as pure as that proposed for Providence, undoubtedly a smaller area would be sufficient, even to allow a portion of the area to remain idle successively for cleansing.

The filter is composed of a layer of sand resting on fine gravel, and this on coarser gravel or broken stone, in which are laid perforated pipes to collect the water after filtering. The whole thickness of sand and gravel I should make about five feet. The surface of the water should be kept several feet above the sand, and it should run through at the rate of about eight inches an hour. It may be run much faster; but the filtering effect increases with the time occupied, and the above rate is thought to be the best for economy and efficiency. The surface of the sand collects most of the impurities; and this

must be scraped or washed off from time to time, as the accumulation of deposit makes it necessary.

Such filter beds are used when the water has a large amount of impurity, as at Chelsea, England, where the foreign matter amounts at times to more than sixty-five grains in a gallon. In these filters the upper layer of fine sand is renewed about every six months, but the body of the filter had been in use for about twenty years at the date of my information. When there is less impurity, a more economical process is sometimes adopted. The water is passed through a filter, or strainer, of coarse sand, or very fine gravel, which "allows the water to flow through it with great rapidity into the mains, but completely entangles and obstructs all those fine fibres which are the result of vegetation, and also takes out all leaves, and things of that kind, which may happen to blow into the reservoir." By reason of the much greater rapidity of flow through this coarse filter, the extent may be very much less, and the cost comparatively trifling. If those who decide the matter for the city of Providence, shall conclude that the more economical and coarser filter is sufficient for their purpose, they may rest satisfied in the assurance that they will, even in that way, have a water purer than is obtained in almost any other city.

ECONOMY.

To supply the wants of the city, the water must be distributed to all parts under an available head somewhat exceeding the height of the buildings. The best plan for distribution, which may vary somewhat with the source of supply, will be considered elsewhere. At present we have to consider only the economy of bringing into the city the supply demanded, at the requisite head. Two elements are to be observed in regard to the movement of the supply, the horizontal distance which it is to be brought, and the vertical height which is to be obtained. But no other power than what is necessary to overcome friction is required to move water horizontally, for which a slight descent

is sufficient. Or, in other words, by assuming an additional height of, say, one and three-tenths feet in a mile, dependent on the relative size of conduit, we can omit the consideration of horizontal distance, so far as power is concerned. But, as a matter of economy, the horizontal distance remains a very important element, by reason of the aqueduct necessary.

The least possible expense of supply would be when the water was actually found at a sufficient head in the centre of the city. The moment we have to leave this centre for a supply, or to take it at a lower point and raise it to the height required, we begin to count cost. In one case, there is the cost of aqueduct; in the other, the cost of power. The problem of economy, then, must embrace these two factors.

To be of equal economy, the cost of a certain excess of distance of a high source over a lower will be equal to the sum of which the continual cost of pumping from the lower source to the height required equals the interest. This distance in excess varies somewhat with the quantity of water to be supplied, the location of the aqueduct, the cost of power, &c. In the present case, taking the quantity of water required at twelve millions of gallons per day, the location of the aqueduct an average location inland from Providence, and the cost of power at present rates, the excess of distance which water could be brought, and the interest on the cost of the aqueduct not exceed the principal of the cost of pumping, would not be more than eight miles. This estimate is based on the supposition that the water itself costs nothing in either case.

But, in point of fact, water at an elevation is valuable property, especially in such a neighborhood as that of Providence, where every foot of water privilege is turned to account in manufacturing. The power of falling water is the same as the power required to raise the same quantity to the same height, less friction and waste; and its value to the mill-owner would not be less than its equivalent in steam-power.

Taking our amount required as twelve millions of gallons, at the height of one hundred and sixty feet above tide-water in the city, or, to allow for friction in the most economical

aqueduct, one hundred and seventy feet height at eight miles distance, and in a natural water-course it would be equal to about 516 effective horse-power. Making the necessary deduction from the cost of eight miles of aqueduct for the cost of this power, and we have as the actual length of aqueduct which economy would allow us to build, in order to secure the head required, four miles.

In choosing among the various sources of supply, in point of economy, we seek first, *nearness*; second, *height of head*, within a variation of four miles; third, *cheapness and convenience of privileges and territory*; and, fourth, *exemption from unfavorable contingencies*, — that is, security in construction and future operation.

The question may arise in some minds whether the public good will be best served by the introduction of water at the public expense, or at the expense of private companies. Certain general considerations would, on their face, seem sufficient to determine this question. Pure water is as universal a necessity as pure air. There is no individual in the community who may not receive direct, personal benefit from the introduction of a purer and more abundant supply of water. Then the need of water for the more public uses is very great, almost sufficient in itself to warrant the expense of its introduction at the public charge. Thus there would seem to be no question that the enterprise is sufficiently public in its nature to make it a proper one for a city, in its corporate capacity, to assume. On the other hand, if it should be intrusted to a private company to accomplish equal results, there must be provided by the company an equally extensive system of supply and distribution. For this, the city must grant extensive, if not exclusive, rights, such as cannot be safely granted to private hands except with ample provision for forfeiture. Indeed, it would be out of the question to intrust to private hands the total supply of water for the inhabitants, except with the clearest provision for the immediate and absolute control by the city on occasion, and for constant regulation as to the nature, amount, and cost of supply. In other words, the control that the city must retain would be such as to

limit the functions of the company nearly to those of a public water-board, with the exception, that on the company would rest the risk of the enterprise, the chances of loss or of gain. This risk, it must be observed, would be greatly increased by the dependence of the company on the future action of the city.

Now, as the cost of the works and of the running expenses may be counted as the same in either case,—there being no good reason for any difference,—it is obvious that a large profit must be paid to any private company to induce it to assume the risk—a profit that would be saved to the consumers by their bearing the risk that properly belongs to them. Or if it be assumed, as is often done, that a private company with a sharp eye to profit would make such a saving in the expense of the works as to get sufficient profit in that alone, we are driven to the still greater objection, of the uncertainty of works constructed with a view mainly to present profit, with the possibility of disastrous defect hereafter. But it does not seem necessary to argue these points. The practical adoption and good working of the public system of supply in other large cities must have more weight than any theoretical argument. In fact, where the other policy has prevailed for a time, it has often been found necessary, at a later day, for the public to assume the works constructed by private hands; and, in such cases, as would be supposed, the works have been found wanting in adaptation to the growing needs of the community, and have had to be abandoned, or increased at heavy loss.

As an instance, we may refer to the city of Salem, Mass., where the following conclusion was arrived at by an intelligent committee who carefully considered the question of whether water-works should be undertaken by a city corporation or intrusted to private parties:—

“A liberal supply of water is of vital importance to every city of considerable size. It should be furnished in the most free, full, and economical manner. Its control should never be given to those who have an interest in making it expensive; but its managers should be in a position, where they have only the pub-

lic welfare to regard, and where they are responsible to consumers, rather than to venders."

Adopting these views, the city applied to the Legislature for a charter to introduce water at the public expense; but the private corporation which had been constantly furnishing the citizens with water, under a charter granted in the last century, opposed the application, desiring to have their own powers enlarged and capital increased. The views of the city committee were clearly sustained before the Legislature; and a charter was granted, under which works are now in progress and nearly completed.

Previous to examining the sources and modes of supply open for the city of Providence, it may be well to note in the following table the means adopted in other cities of the United States. It appears that there are now but four cities in the Union, including Providence, of over 20,000 inhabitants, by the last U. S. Census, without a public supply of water, and but one, besides Providence, of over 30,000, namely Milwaukee, where, we learn, preparations are now being made to supply the want. It will be observed also, that of the whole number of cities supplied, of which we can learn the means, but thirty-three have a natural head of water, and the remainder, fifty-one, use pumps; and that fifty are supplied from rivers, twenty-one from ponds or lakes, and fourteen from springs.

Of the cities having more than thirty thousand inhabitants, but seven are supplied by gravitation, and sixteen are supplied by pumping. Sixteen are supplied from rivers, four from ponds or lakes, and two from springs.

Newark, N.J., though now supplied by gravitation, as shown in the list, is to have new works completed in 1869, when the supply will be pumped. A few places which are supplied mainly by gravitation are also partially supplied by pumping.

WATER SUPPLY OF CITIES AND TOWNS. (CONTINUED.)

Population in 1900.	Rivers.	Ponds or Lakes.	Springs.	Wells.	Pumping.	Gravita- tion.	Means unknown.
10,000 to 20,000	Alexandria, D.C.	.....	.....	.....	.....	.....	.....
	Augusta, Ga.	.....	.....	.....	.....	.....	.....
	Camden, N.J.	.....	.....	.....	.....	.....	.....
	Harrisburg, Pa.	.....	.....	.....	.....	.....	.....
	Lancaster, Pa.	.....	.....	.....	.....	.....	.....
	Lawrence, Mass.	.....	.....	.....	.....	.....	.....
	Nashville, Tenn.	.....	.....	.....	.....	.....	.....
	New Albany, Ind.	.....	.....	.....	.....	.....	.....
	Nashua, N.H.	.....	.....	.....	.....	.....	.....
	Petersburg, N.J.	.....	.....	.....	.....	.....	.....
20,000 to 30,000	Petersburg, Va.	.....	.....	.....	.....	.....	.....
	Trenton, N.J.	.....	.....	.....	.....	.....	.....
	Wheeling, Va.	.....	.....	.....	.....	.....	.....
	Auburn, N.Y.	.....	.....	.....	.....	.....	.....
	Chelsea, Mass.	.....	.....	.....	.....	.....	.....
	Elizabeth, N.J.	.....	.....	.....	.....	.....	.....
	Newburgh, N.Y.	.....	.....	.....	.....	.....	.....
	.....	.....	Bridgeport, Conn. Springfield, Mass.	.....	.....	.....	.....

30,000 to 30,000	Allegheny, Pa.	.....	.....	.....	.....	.....	.....
	Hartford, Conn.	.....	.....	.....	.....	.....	.....
	Jersey City, N.J.	.....	.....	.....	.....	.....	.....
	New Bedford, Mass.	.....	.....	.....	.....	.....	.....
	Savannah, Ga.	.....	.....	.....	.....	.....	.....
30,000 to 30,000	Wilmington, Del.	.....	.....	.....	.....	.....	.....
	Worcester, Mass.	.....	.....	.....	.....	.....	.....

	Highland District, Boston.	.....	.....	.....	.....	.....	.....
	Cambridge, Mass.	.....	.....	.....	.....	.....	.....
30,000 to 30,000	Charlestown, Mass.	.....	.....	.....	.....	.....	.....
	Portland, Me.	.....	.....	.....	.....	.....	.....
	Salem, Mass.	.....	.....	.....	.....	.....	.....

[illegible]

SOURCES.

Having considered the quantity and quality of water to be desired, and the general principles which govern the economy of its introduction, we proceed to investigate the sources from which it may be obtained.

Let us first survey, briefly, the entire field of water-supply. Directly or indirectly, all water comes from the clouds. Its course is indeed that of a circle, any point of which we may take as the point of beginning. But on the earth it is more divided in form, and it may be viewed as a whole most simply and comprehensively, as at the initial point, in the form of atmospheric vapor or cloud.

Condensing in the clouds, the water alights on the whole surface of the ground with considerable evenness. The depth of water deposited in the neighborhood of Providence averages about 41.7 inches a year. The least depth within thirty-seven years was 30.5 inches, in 1846. The greatest was 55.17 inches, in 1863. Alighting on the surface, what the ground can absorb readily, sinks in, a portion remaining near the surface, to be taken up by vegetation, or evaporated directly to form new clouds, and another portion sinking to swell the volume that saturates the porous strata resting on the underlying rock; while the surplus, which does not readily pass off in these ways, glides over descending surfaces, or, passing through them, reappears at lower points, and forms little streams, brooks, ponds, and rivers. From all these, there is a constant return by evaporation to the atmosphere, and the remainder replenishes the ocean, which is the great reservoir, or caldron, for the distillation and return of the water to the clouds.

Our question is, at what point in this circulation of water to arrest its progress, and turn it to our use. We note that its highest point of purity is in the clouds, whither the minute particles, rising invisible from the surface of the earth or ocean, have been borne freed from all impurities. Condensing and descending, the rain or snow first washes clean the lower atmosphere, and

then falls in a purer state than we can elsewhere find it. There is no water to be found, except by artificial distillation, so pure as that which may be collected from rain, after enough has fallen to cleanse the air of dust, smoke, carbonic acid, &c. On the surface of the earth, it continually gathers vegetable and animal impurities.

That water which percolates through the earth, into deep, porous basins, is filtered of most of its animal and vegetable impurity; and, in case the filtering material contains no soluble mineral matter, the water may become as pure as when first dropped from the clouds, though practically seldom, if ever, so found. For the most part, the water that flows through earthy strata finds various mineral salts, which it takes up in solution, and holds with great tenacity. Hence, with rare exceptions, the deeper in the earth that water is found, in a given location, the more mineral salts it contains.

The maximum of ordinary mineral impurity is found in the ocean, whither the salts are borne in small quantities by rivers, and are left to accumulate, while the waters that bore them are lifted to the clouds. The purest natural water known is that of the River Loka, in northern Sweden, which contains only $\frac{1}{10}$ of a grain of mineral matter in an Imperial gallon.

On the score of purity, then, we should look first to the falling rain, and last to the ocean, or very deep wells; and if obliged for feasibility to take water that is not satisfactorily pure, and to purify it, we should take that by preference which has only vegetable and animal impurity; as this can be more easily removed by filtration than mineral accretions.

To obtain the water required, by saving the rain-fall on the city area, is out of the question, for the several reasons, that the area is not sufficient to collect the quantity required, if all that falls could be saved; that the rain-fall could not be collected in the city with sufficient purity; and that it is actually necessary in its present service of washing the houses and streets. To use what water is collected from this and other sources after filtration through the upper earth strata of the city, is what is done by the ordinary wells. That these are lamentably deficient in purity, is shown by Prof. Appleton's analyses, while

the quantity is unequal to the demands of a prosperous manufacturing city, and is growing less as the city streets and areas are more generally paved.

The same is true in regard to deeper or Artesian wells. But as these are not so generally known, and as there exists a vague idea of the possibility of obtaining an unlimited supply of the best water by only sinking a well deep enough, it may be well to state some facts on the subject.

To rightly apprehend the conditions of water underground, it is necessary to picture to the eye the surface of underlying primitive rock, stripped of all loose stone and earth that now lie upon it. According to the particular locality, it would be found to have all the unevenness of upper surface, with hills and valleys, gorges, and basins, even to ocean depth. Over this surface, water is distributed with constant accretion from higher points, and gradual descent towards the lower. As on the upper surface, wherever is a ravine, a hollow, or a basin, there water runs, and is held. But these hollows are not empty of all but water under ordinary circumstances. They are filled with rock of later and looser formation, or with beds of rock fragments, gravel, sand, or clay, in the pores and crevices of which the water stands. Upon these beds or strata, lie often other beds or strata of different nature, to greater or less depth, and containing more or less water, according to their situation and nature.

Providence is situated in a basin of the primitive rock, extending northward into Massachusetts, and at Providence about twelve miles wide. The greatest depth of the basin is estimated by Dr. Jackson to be about one mile. This basin is filled with another rock, varying in character from conglomerate slate to gray-wacke and gneiss, and described by well-borers as impervious to water, except in its fissures. A smaller basin in this slate rock, of about two miles width, extends from Fenner's Ledge and Olneyville to the stone-quarries in North Providence, including the site of the city, but interrupted by the high ledgy ground on the east side, which rises like an island above it. This basin is of 150 to 200 feet, greatest depth. At the bottom is a hard, clay, alluvial deposit, covered with a softer diluvial deposit of sand and gravel. Artesian wells are mostly sunk

through the bed of clay into the slate rock. Some of them are on the borders of the clay basin, and are sunk wholly in the rock. Others, in the deepest part of the basin, have not quite reached its bottom. In some the water rises above the surface of the ground, in others it stands at varying distances below. The greatest supply of which we have learned, from any one well, is from the one on Fountain Street, 126 feet deep, the last eighteen feet being in rock, — which gave to the pumps at first, 60 or 70 gallons a minute. The well, however, was soon abandoned; and is now used only to supply a stable. Another well, on Eagle Street, of 170 feet depth, 40 feet in rock, at first ran over at the rate of 40 gallons a minute, and continued so for nearly three years, when the supply failed, and the river was resorted to in its stead.

The practical results from these Artesian wells coincide with what would be our judgment from the geological formation. The compact hard-pan holds a moderate supply of water, limited by its compactness, and by its limited extent of rain-fall. The total rain-fall on the whole clay basin, if all could be collected, is not sufficient to supply the city. The slate rock embraces a larger area, and supplies a larger quantity of water. But this supply is limited to the capacity of the fissures, and is not to be depended on. It is impossible to estimate the quantity of water which is retained in these fissures, and which might be made available if all reached by wells. But it is obvious that to draw twelve million gallons a day would require many wells, scattered throughout the basin, to pump from all of which would, in itself, be very expensive; and experience in other places has proved that such a basin may be soon exhausted.

This view of the precarious nature of Artesian-well supply is confirmed by the following facts and opinions, derived from the best available authorities: —

Messrs. Rawlinson and Smith, in a report on the supply of Birmingham with water, say, in regard to Artesian wells, that “There must be a peculiar configuration of strata to give facilities for the formation of an Artesian Well, — that which in geology is known as a basin formation; and even in a geological basin there must be a peculiar order of strata, — impervious clay above, and sand, or other highly porous water-bearing strata, below.

"If a town or city, as London, Paris, &c., stands on such a basin, water may be obtained by deep boring, and is so obtained, but not to an extent any thing equal to the supply of large populations.

"The deep well and Artesian borings in London are only used for private and commercial purposes, brewing, &c. (and generally only for cooling in these establishments), yet all the wells in the metropolis are in course of exhaustion. *The water-line is reduced year by year.*"

The city uses more than fifty million gallons of water daily, which is supplied from various sources, mainly from rivers, independent of any wells or springs.

These gentlemen declare the following rules: —

"1st. No large town or city can be permanently supplied from wells sunk into the strata upon which it stands. The experiment has been tried in many places. London and Paris, notwithstanding that they stand in the most favorable situation for Artesian wells, do not obtain more than a limited supply by these means.

"2d. The water for the supply of a large town should be visible, and should be of such extent as to preclude the possibility of failure. That wells can be exhausted, however powerful the springs apparently are when first opened, is proved by all mining operations.

"3d. The source of supply should be the least objectionable the district will afford, and the works should be established in such a position as to be available for any future extensions required."

In twenty-one years the water-level in ten of the principal wells in London was reduced 50 feet, thus showing that the basin was being exhausted at the rate of more than two feet vertical depth per year. Most of the large wells at the breweries in London are sunk from 200 to 300 ft. into the chalk; and at this depth few of them yield more than 100,000 gallons per day — about 70 gallons per minute.

Bearing in mind that the proposed works for Providence are to supply more than 8,300 gallons per minute, the following facts in regard to some of the principal wells in the world will be interesting.

M. Arago instances six wells in England and France, the yield of which, per minute, is as follows: 333 gallons, 237 gallons, 200 gallons, 176 gallons, 155 gallons, 237 gallons. The last-mentioned well is 430 feet deep. Perhaps the most famous well in the world is that of Grenelle, in the outskirts of Paris, which is 1,798 feet deep, and yields 576 1-2 gallons of water per minute, which rises 32 feet above the surface. The constant temperature is 81°7 F. It is said to be salt, and used only for heating the hospitals.

The most famous well in this country is probably that at Chicago. From a pamphlet entitled, "History of the Chicago Artesian Well," I learn that water was struck in the first well at a depth of 711 feet. "The water flows at the rate of about 600,000 gallons per 24 hours," which is equal to 416 2-3 gallons per minute. Temperature 58° Fah. The second well is 694 1-3 feet in depth to the surface of the water. "In absence of any accurate measurements, we conjecture that the two wells are now flowing about 1,200,000 gallons per day." The Journal of the Franklin Institute, for June, 1868, says that both the Chicago wells are said to discharge 800,000 gallons per day. But assuming the conjecture of twelve hundred thousand to be correct, both wells supply only one-tenth of the amount required for Providence, or say one-fifth of the amount which would be used by the present population.

From the above "History" I take the following: "The well at Passy, about 1,800 feet deep and 2 feet in diameter, is the largest in the world, and discharges 5,660,000 gallons of water per day — 3,930 gallons per minute. The Belcher well at St. Louis is 2,199 feet deep, and discharges 75 gallons per minute; water 73° Fah., highly impregnated with mineral substances, and has a strong odor; useless for any except medicinal purposes."

The daily papers have lately given accounts of a second well, in St. Louis, 3,300 feet deep. No water being found, it has been abandoned.

"The Kissengen well, in Bavaria, is 1,878 1-2 feet in depth and four inches in diameter, temperature 66° Fah., discharges 750 gallons per minute.

"Two wells at Charleston, S.C., are 1,250 feet deep each, and

discharge about 20 gallons per minute, water salt, temperature 87° Fah.

"The well at Jackson, Mich., is over 2,000 feet deep, no water, and is abandoned.

"There is also a deep well at Columbus, Ohio, and another at Louisville, Kentucky, and hundreds of others scattered over the United States, which have no special significance."

The temperature of the Chicago wells was at first 59° Fah., but has fallen to 57°, and is still falling.

In districts where good Artesian wells are obtained, the results of boring are sometimes uncertain. Instances are very common where some borings will find water, and others near them, and even deeper, will not find it. Many deep and expensive borings have been made in places promising good results without obtaining water at all.

But if it were possible that the quantity of water attainable by Artesian wells in the City of Providence should prove sufficient, the chances are that the quality would be very inferior. The fresh water found within the crust of the earth, or which issues from it in springs, is the result of rain-fall or condensation of vapor. The whole must have passed from the surface; and, as a rule, the deeper the well the more mineral matter the water will contain.

Messrs. Rawlinson and Smith speak of water at the depth of several hundred feet from the surface, near Manchester, as being "impregnated with mineral as strong as brine." The same was found to be true near Sunderland, at a similar depth.

Hughes gives the following in regard to water in the Trias and Permian groups: "1st. That water abounds in the drift gravel covering the New Red Sandstone and the Permian Rocks; but this is only sufficient for private domestic supply on a small scale, and cannot be depended on for the public supply of large towns.

"2d. That the water in the superficial drift is usually very impure, containing sulphates of lime and magnesia in large quantities, and being frequently, in towns, much contaminated with organic matter."

The water from the Artesian wells at Chicago was analyzed

by Dr. F. Mahla, and "a gallon found to contain 71.7 Troy grains of solid mineral substances in solution." The river-waters near Providence contain only about two and one-half grains of mineral and organic matter together.

The returns made by the police show that of the three hundred and sixty-seven families supplied by Artesian wells in Providence, "one hundred and eighty-five families consider the water of very inferior quality." In general, the water is hard and unfit for steam-boilers by reason of containing salts of lime, &c., as would be expected from its percolating through rock in which there is more or less limestone. Thus it appears that there is no encouragement whatever for expecting to obtain a satisfactory quantity or quality of water from Artesian wells in the city of Providence or its vicinity.

Concluding, then, that it is impracticable to secure our water-supply from the rain-fall in or about the city itself, we must go into the country, and seek there the most available collection of rain-fall for our purposes.

Calling the lowest annual depth of rain-fall to be anticipated, thirty inches, it would require an area of about eight and one-half square miles to receive the amount, equal to twelve million gallons a day, which we desire to secure. But it is impossible to collect all the water that falls, the proportion actually lost by evaporation and absorption being not often less than one-half. The average found collectable at Lake Cochituate during fourteen years is forty-six per cent. In one year, it was as low as twenty-five per cent. On the Mississippi and its tributaries, it has been found varying from fifteen to ninety per cent.

And, again, we cannot always save and store for use all that is collectable; much of what falls in the rainy months is lost by overflow, unless there are storage basins largely in excess of the usual supply. It would seem therefore hardly safe in extreme cases to count on saving for use twenty-five per cent of the total rain-fall, were it not for the wide-spread underground storage or water-table, which, though not easily measured, because of the varying degree of perviousness in the strata, has a very important part in the actual results. It is probable that during the dry months the entire rain-fall, and more, is often

evaporated and lost from the surface; but careful measurements of the flow of streams at dry times have shown that the water-table, or under-ground storage basin, supplies a quantity equal to about twenty-eight per cent of the rain-fall, thus acting as a regulator, storing water in times of freshet, and giving it out in times of drought.

With this in view, I count on twenty-five per cent as a safe basis, and find a drainage-area of thirty-four square miles to be the least that should be looked for to supply the city of Providence, under favorable circumstances of collection and storage; though with this area we should ordinarily have a supply largely in excess of our demand.

Looking now at the whole district extending fifteen or twenty miles from Providence, we find the rain-fall drained towards the city by the Blackstone, the Moshassuck, the Woonasquatucket, and the Pawtuxet Rivers, in Rhode Island; and by the Ten-Mile River, mainly in Massachusetts.

To know the capacity of a source of supply we have two guides, — the actual amount of water flowing at a given time, and the drainage-area from which it comes. When the actual flow is obviously far in excess of our demands, we need look no further; when it is plainly less than is required, it needs no further consideration; but when it is near enough to the amount required to cause doubt, a calculation of the drainage-area will assist in settling the question.

Examining now the flow of water from the land around Providence through its final channels, the Blackstone, the Moshassuck, the Woonasquatucket, the Ten-Mile, and the Pawtuxet Rivers into the Bay, and looking to see at what point near the city we can tap their waters and obtain the quality and quantity of water we desire, we find an ample quantity in each of them, the Moshassuck alone excepted, at a short distance above their outlets. The total drainage area of the Moshassuck is but twenty square miles, or about half what is required. The drainage-area of the Woonasquatucket is about forty-eight square miles, and its flow is undoubtedly sufficient near the mouth, though other considerations are not in its favor as a source of supply. The Ten-Mile River has a drainage-area

of fifty-three square miles, and an ample flow of satisfactory water at a distance of three miles from the City Building. The flow of the Blackstone is so abundant as to make a particular examination of its drainage-area unnecessary. By the state map of Massachusetts the area is seen to exceed three hundred and sixty square miles, above Pawtucket. Its waters can be obtained satisfactorily, and of good quality, within five miles of the City Building: The Pawtuxet has an abundant flow of water that is of excellent quality, at a distance of six and one-fourth miles from the City Building. Its drainage-area, above the point proposed for taking our supply, is nearly two hundred square miles, as estimated from the map of Rhode Island.

We have thus at least three satisfactory sources of supply within seven miles of the city. Before considering in detail their respective merits, it is proper to look beyond them, and see if there is any source of sufficiently superior merit to justify the additional cost of the greater distance. Nothing more is to be desired in respect to quantity. We have seen that nothing can be gained in economy by going more than four miles farther for a higher head. The necessary head cannot be found within that distance of the points proposed for taking the water, on either of the rivers mentioned. The nearest point at which our required height can be obtained is on the north branch of the Pawtuxet at Hope Village, twelve miles from the city, or six miles farther than the most satisfactory point for taking the water from the same river by pumping, and nine miles farther than from the Ten-Mile River. No economy, then, can be gained by any high river head, because of its distance. But is there not some pond or natural reservoir which may compensate for its distance by high head and superior quality?

♥ To our *fancy*, water in a still, clear pond, looks purer than in a rapid river where we know it has passed through water-wheels and received more or less sewerage. In point of fact or of chemical analysis, no purer water in large quantity is to be found than that of rivers. The Pawtuxet, for instance, a mile or two below the Pontiac Mill, contains but 2.14 grains of impurity per gallon, and its hardness is but 0.33 of one degree. We

should not, therefore, expect any real advantage in quality from a pond, were such an one as we should require at hand. But, in fact, we find no pond or natural reservoir of fresh water within twenty miles of Providence that would furnish an eighth of the supply required. We need a supply of twelve million gallons a day with a capacity for increase beyond that. For this minimum, we assume that a drainage-area of at least thirty-four square miles is necessary.

Of the largest ponds, Wallum Pond has a drainage-area of 3.9 square miles, and, at the time of observation, delivered no water.

Moswansicut Reservoir has a drainage-area of 3.5 square miles. It was being drawn upon for the mills, and delivered about two and one-quarter million gallons of water per day when examined.

Carr's Pond, drainage-area 1.2 square miles, delivered no water at time of examination.

Olney's Pond, drainage-area 1.05 square miles, delivered none.

Mashapaug Pond, drainage-area less than one mile, delivered two hundred and fifty thousand gallons.

It is evident, therefore, that the rivers furnish not only the best but the only available source of supply.

WOONASQUATUCKET.

The Woonasquatucket River has a less drainage-area than the Ten-Mile River: it flows through a country less favorable to uniform flow of water, and more likely to furnish foreign matter.

The water, except in freshets, is wholly used by the various establishments upon it, for some of which it is more valuable than merely as power; so that, if the city should require the entire supply of the river, full compensation could not be made to the owners below by merely supplying an equal amount of steam-power.

A much larger amount of refuse-matter, in proportion to the

flow of water, is emptied into it than into the other rivers; and the sewerage from the numerous villages could not have time to be decomposed before reaching the point at which the water would be taken. The construction of filter beds would be attended with great cost; and other expenses would probably be heavy.

Besides these unfavorable features, the capacity of this river, estimated by its drainage-area, is not more than we should desire as a liberal allowance for a supply for twenty years to come, and cannot be safely calculated on for future extension. The preliminary survey not developing this as, in comparison with others, a favorable source of supply, I have not continued the examination, and have, therefore, no plan to propose for taking its waters into the city.

SEEKONK RIVER.

The lowest point possible for taking the waters of the Blackstone and Ten-Mile Rivers, and nearest to the centre of the city, is the basin called the Seekonk River. At present, this is a tidal basin. To convert it into a fresh-water reservoir, it will be necessary to construct a dam to shut out extreme high tides. At Red Bridge, such a dam would be 600 feet long, and in places 44 feet high, on a soft bottom, in water at ordinary high tide 40 feet deep. A large ship-lock must be built through the dam to accommodate the passage of vessels to and from Pawtucket. The amount of water-power to be obtained at the dam would be sufficient in time of freshet to raise the water required by the city into the distributing reservoirs; and, in time of drought, it would furnish about one-fifth of the power required for that purpose. But the power thus gained is no more than the power destroyed at Pawtucket, Omega, and Ingrahamville, though in time of freshet it is not now all made available at those points; and the damage to be paid to mill-owners at those places must include injury to machinery and mills in addition to the value of the power.

The wharves at Pawtucket would be overflowed, and would need to be raised. George F. Wilson's River Factory, the Brick Yard and the property at Ingrahamville, all on the east side, would suffer some damage. The land damage would probably be slight.

To make the best use of the power got at such disadvantage, water-motors of sufficient power to do the whole work must be provided for use in time of freshet; and, in time of drought, steam-motors to within twenty per cent of the whole power must be used. That this arrangement would be expensive and complicated is evident.

The basin is generally shallow; and the bottom is now covered with black mud to the depth of six to eight feet, which, under the flow of tide-water, is brackish and fetid. To make the basin a fit storage reservoir, it would be necessary to remove the present accumulation of mud, at an expense, probably, of \$2,000,000, and to repeat the operation as often as becomes necessary.

The scouring effect of the ebb tide in the harbor would be lessened materially by cutting off the tidal-basin above Red Bridge; and the current would probably be changed from one able to carry along its suspended matters, to one that would allow deposits. Thus the harbor might receive serious injury.

All these expenses and disadvantages exceed by far the only advantage which I see in taking the water at so low a point, namely, the saving of length of aqueduct. I conclude, therefore, that it is not desirable to take the Blackstone waters below Pawtucket; and I present no detailed plan for that purpose.

PLANS PROPOSED.

Coming now to present in detail such plans for supply of water as I find really practicable and satisfactory, — namely, from the Blackstone at Pawtucket, from the same at Scott's Pond, from

Ten-Mile River, and from the Pawtuxet River, — it may be well to premise some of their common features and requirements.

The ordinary requirements of water-distribution in a city are sufficiently well established in theory and practice not to need much study.

An ample fountain-head; a conduit or pipe to the city; large main pipes, like large arteries, through central lines in all the districts to be supplied, with a net-work of smaller branch pipes through all the streets, make the ordinary, natural distribution. To this must be added, in case the original source is not of sufficient elevation, a distributing reservoir of the required height, and pumps to fill it. In fact, a distributing reservoir is used as an equalizer whenever the fountain-head is far distant. Different circumstances affect the proper position of the distributing reservoir, which is to be supplied by pumps. Convenient high ground is a controlling element. Then the pumps should be as near as practicable to the reservoir. Thus, in two of the four plans presented, the reservoirs are placed near the source, at a distance from the city. In the other two, they are within the city limits: in one case, because of the nearness of the source and of the absence of any other convenient high ground; and in the other, because of this absence, and because, though the source is distant, its water has natural head enough to bring it into the city to pumps near the reservoir.

In supplying the City of Providence, there is this peculiar circumstance, requiring peculiar arrangements. There are three principal levels in the city, with considerable difference between them. First, there is the lower level, in the neighborhood of the river, on which is the most of the business section of the city. This may be called, at an average, 10 feet above high-water level. Next, there is a large district on both sides of the river, but most extensive on the south, the level of which may be called 75 feet above high water. Lastly, there is a district on Prospect Hill, of limited extent, but necessary to be supplied, the height of which ranges from, say, 90 to 200 feet above high water. It is obvious that there would be no economy, but loss, in procuring a head sufficient to supply this highest portion of the city, for the water to be distributed on

the lower levels, besides entailing endless troubles from the strain on pipes and faucets, or extraordinary expense for strength. But I find that it would not be economical to make any distinction between the two lower levels. I propose, therefore, to supply all the city below the level of about 90 feet, from a reservoir of about the height of the junction of Hope and Olney Streets; that is to say, with a head of about 156 feet above high-tide.

If the water should be taken from the Blackstone through Scott's Pond or from Ten-mile River, I would place this lower-service distributing reservoir at the above-mentioned place. If it should be taken from the Blackstone River at Pawtucket, I would place this reservoir on the high ground south-west of Pawtucket, three miles from the City Building; and if the Pawtuxet River should be the source of supply, I would place the reservoir on Sockanossett Hill, five and four-tenths miles from the City Building; for the reason that a reservoir in the city would be too far distant from the necessary location of the pumps, near those rivers, for easy and economical action. In either case, the height of water from this lower distributing reservoir, at a distance from the city centre equal to that indicated for a city reservoir, would be between 150 and 160 feet. Then for the high service, I would place, in either plan, a smaller reservoir near East Turnpike, opposite Doyle Avenue, the high-water level of which would be 230 feet above high tide. This would be supplied by pumps located at the lower reservoir, or at the nearest point of one of the main pipes.

In every plan that has been deemed worth serious consideration the head of water at the source is considerably less than that required for the lower service. Thus on every plan it is necessary to supply this deficiency of head by pumping. It is most economical of power and of constructive cost to locate the pumps near as may consistently be to the reservoir which they supply, and to depend on the gravitating flow to bring the water its horizontal distance.

These general statements will assist an understanding of the different arrangements proposed in the different plans. In general character of construction the plans are the same, and their total

estimates are intended to exhibit fairly the respective cost of equivalent works. The basis throughout has been that of ample estimates for the most substantial and durable construction, without any allowance for idle display or needless waste. The expense of the work, in many portions, will depend materially on the character of the ground, which cannot be ascertained until the work is in progress. In all cases of doubt, I have intended to estimate for the worst contingency. It is therefore probable that, in actual construction, many things included in the estimates may be omitted, or made less expensive. For cost of steam-power in pumping, the experience of water-works in operation in other cities is taken. For pumps, estimates are based on proposals from the best makers. For pipes, we take cast iron of best quality, at present bids of large manufacturers. Possibly a cheaper pipe may be substituted in construction for the smaller sizes. The estimates for land damages were furnished by yourselves. Those for water-power damages are based on the cost of furnishing and maintaining equivalent steam power as estimated by the Corliass Steam-Engine Company.

PAWTUCKET PLAN.

Water may be taken for the city from between the lower and the upper dam at Pawtucket. The supply is beyond all question abundant, and the quality at present is satisfactory. We have no analysis of the water taken directly from the river at Pawtucket, but the water from the river at Ashton, about six and a half miles above, was found by Prof. Appleton to contain 2.3 grains of matter per American gallon, of which 1.42 was mineral, and 1.11 organic and volatile matter. The hardness was 0.7 of one degree. To this small amount of impurity, there is some addition from the surface drainage of the intervening villages, and from Abbott's Run; but not enough to make the waters as yet otherwise than of a fair degree of purity and softness. At some future time, however, when, with an increased population,

water is supplied to the villages on the banks from Pawtucket to Valley Falls, and sewers are introduced leading to the river, the water may probably become too much contaminated for domestic use; and there is not distance enough between the points of contamination and the point for drawing off the water in the city conduit, to allow sufficient action of sun and air for the dispersion of the impurities. The only remedy for this difficulty would be to gather the sewage matter and dispose of it on the land, or to collect it by intercepting sewers on each side of the river leading to points below the lower dam. Either of these plans, though probably not impracticable, would be attended with considerable difficulty and expense.

In the absence of any natural storage basin that would answer for a settling-basin, it would be necessary to rely on the receiving and distributing reservoir for this purpose; and probably there would be a greater necessity for filter beds for water from this source than for that of any other proposed plan. The most convenient place for the distributing reservoir and filter beds is on the high ground south-west from Pawtucket, between the two turnpikes.

According to the plan projected for supplying the city with water from this source, a substantial stone canal, with suitable head-gates, would be built in connection with the lower dam, so arranged as to secure the necessary supply of water to the city in case of accident to the canal leading water to the mills. An iron conduit, four feet in diameter, would be laid from this canal a distance of 2,750 feet. This pipe would have a capacity to carry twelve million gallons in ten hours, with a fall of five and one-half feet, if lined with tubercles, as would soon be the case if unprotected; or with a fall of three feet, if coated with prepared pitch to preserve its smoothness. The average height of the top of the dam is 14.7 feet above high water at Providence. The design is arranged for the addition of another similar pipe, if it should ever be necessary. Extra supports and protection would be required for the conduit under the mills and at the mouth of Sargent's trench.

The pump-well and engines would be situated near a wharf, at a point convenient for the landing of coal. Three pumping

engines would be required to enable the full supply to be taken from the river during the working hours of the factories.

The two force mains, of three feet diameter each, would be only twenty-two hundred feet long; and, in a favorable location, requiring no air-cocks nor blow-offs.

The reservoir and filter beds would be located on the high ground southwesterly from Pawtucket, lying between the two turnpikes. The filter beds would be four in number, having an area of about three and one-third acres, and occupy the position of the ordinary division wall of a receiving and distributing reservoir, having the receiving portion on the northerly side, with an area of about four and one-third acres and fifteen feet depth; high water being at 163 feet above high tide. The distributing portion on the southerly side would have an area of about five and nine-tenths acres, and a depth of fifteen feet, high water being at 161 feet. This height of water would be sufficient to deliver the water near North Burying Ground, at a height of $155\frac{1}{2}$ feet; at the old city line, on Greenwich Street, at $147\frac{1}{2}$ feet; and at the new city line, on the same street, at 143 feet, above mean high tide.

The design is so arranged that either one of the reservoirs, or either one of the filter beds, may be cleansed while the works are in operation. The available storage capacity of the reservoirs and filter beds is 51,724,000 gallons, equal to a supply for four and one-third days. The influent and effluent chambers are designed for attaching an additional pipe in each when it may become necessary. From the effluent chamber, two leading mains, of three feet diameter each, would extend to and along the Pawtucket turnpike into the city, through North Main Street, and thence supply that portion of the city lying below a level of ninety feet above high tide, through the city distribution.

At Olney Street a branch-main of two feet diameter would lead to the upper service pumping-station on Olney Street, between Camp Street and East Turnpike. Two engines, each having a pumping capacity of one million gallons in sixteen hours, would be provided at this point, pumping directly into the system of pipes for supplying that portion of the east side

of the city lying above a level of ninety feet above high tide, and connecting, by a main twenty inches in diameter, with the High-Service Reservoir on East Turnpike, opposite Doyle Avenue.

The High-Service Reservoir would have a water-surface area one hundred and four feet square, the inside face of the walls being vertical to prevent injury by the fluctuation in height of ice in winter. The high-water level would be two hundred and thirty feet above high tide. The depth of the reservoir would be fourteen feet below high water, and the bottom about fifteen feet above the present surface of the hill. The coping is designed to be two feet above high water.

The whole reservoir would be constructed of stone masonry, encased in granite, and supported on arches of the same material, all of substantial construction and of plain and appropriate design.

SCOTT'S POND PLAN.

Above Pawtucket, the most favorable point from which to take the water of the Blackstone, seems to me to be at Scott's Pond. This pond is near Lonsdale, about five miles from the City Building. It is about five-eighths of a mile long, one-tenth of a mile wide, and, as found by about fifty soundings, from fifteen to fifty-seven feet deep. It would make an excellent settling basin for the deposit of matter held in the water in suspension, thus relieving the filter-beds to a considerable extent. The surface of the water stands at about seventy feet above high tide, varying a few inches above and below, each day, as the water is drawn for the Lonsdale Mills, for which the pond is now used as a reservoir. From notes furnished by the superintendent, it appears that these factories now require about 340 cubic feet of water per second, to run them at full speed. This water is drawn from Blackstone River at Ashton, through the old Blackstone Canal, which is not large enough to convey this quantity in working hours without too much loss of head, if at all. To

aid in the supply, Scott's Pond is used as a reservoir, to be filled through the canal during the night, and drawn upon when most needed, in the day. When the water in the river is too low to furnish a sufficient quantity to drive the machinery in this way, steam-power is used to supply the deficiency.

The losses to the Lonsdale Company in case of taking the city supply from Scott's Pond, will be, in addition to the loss of a certain quantity of water from the river in the dry season, the loss of head in the canal, due to its conveying an increased quantity of water, and the further loss of head due to the necessity for drawing more water through the canal during working hours, owing to the diminished value of Scott's Pond as a reservoir. These peculiar losses can be avoided by enlarging the canal from Ashton to Lonsdale, which could be done, I estimate, at an expense of \$27,000, even if the mills are allowed to run during the execution of the work. The removal of silt from the canal bed might cause some leakage, but the experience in similar cases warrants our belief that the bed would be again silted up in the course of a single year; and, as the leakage could not equal the amount we propose to draw, but which we should not wish to draw within that time, the mills would suffer no damage in that way. If an amicable arrangement could be made with the Lonsdale Company for the enlargement of the canal, so as to deliver the quantity required for both purposes, a considerable amount would be saved to the city in the construction of the works. But as it is not known that such an arrangement could be made, and as we wish to make such estimates as are believed to be certain to cover the cost of any proposed plan, it would seem best for our present purpose, to estimate the value to the Lonsdale Mills of the amount of water required for the city, as stored in Scott's Pond, without entering into any scheme for compensation, other than a proper payment for the power taken.

Water taken from three points has been analyzed by Professor Appleton, and found to be of the following quality, viz.: From Ashton Dam, total impurity 2.3 grains per American gallon; consisting of 1.2 grains of mineral matter, and 1.1 grains of organic matter, &c. The hardness was 0.7 of one degree. From

canal by the Lonsdale Mills, total impurity 2.2 grains: mineral 1.2; organic matter &c., 1.1; hardness 0.7 of one degree. From southerly end of Scott's Pond, total impurity 2.2 grains: mineral 1.2; organic &c., 1.2; hardness 0.7 of one degree.

I am told that the people at Lonsdale have used the river-water for several years, in preference to the well-water, for drinking and other domestic purposes.

In this plan it is designed to take the water from the southerly end of Scott's Pond, from eleven to fifteen feet below the surface, through an iron conduit four feet in diameter, leading to a stone receiving-chamber containing the screens, head-gate, &c. Thence the water would be taken under the highway, and through an open stone canal be supplied to the filter beds, four in number, lying near the highway and the site of the old Blackstone Canal. The surface of the water over the filter beds would be at the same height as in Scott's Pond; the extreme high water being 72 feet, and extreme low water 68 feet. The surface of the sand will be 65. The area of water surface in the filter beds, would be about three and one-tenth acres. From the filter beds the water would be drawn through chambers into the main conduit of iron, four feet in diameter, leading down the tow path of the old Blackstone Canal, with one slight variation, nearly to the Providence and Worcester Railroad; thence crossing the valley, and gradually rising along the side hill, and through the ridge, into the continuation of North Main Street, along which it is carried, until about one quarter of a mile within the city limits, to the pump-well. The total distance from the filter beds to the pump-well, being 17,784 feet.

In the pump-well, the low-water line would be 56.24 feet above high tide, assuming a flow of twelve million gallons in twelve hours. Two pumping engines, each having a pumping capacity of 6,000,000 gallons in 16 hours, would be situated at this point, and would force the water through two iron pipes, 3 feet in diameter, a distance of 3,700 feet to the distributing reservoir, which would be situated on Hope Street, and include nearly all the land in the rear of lots on Olney, Prospect, and Barnes Streets. The water-area of this reservoir would be 9.20 acres, at a height of 156 feet above high tide, which

would enable water to be delivered at Butler Hospital at a height of 149 feet; at the old city line on Greenwich Street at 148 feet; and at the new city line on Greenwich Street at a height of 143½ feet. The bottom of the reservoir would be about 141 feet above high tide. The reservoir would be provided with influent and effluent chambers, with a division embankment so arranged that one part may be cleansed while the other part is being used to supply the city. The bottom of the reservoir and the embankments would be made tight by clay puddling, and the interior slopes would be paved. The embankments would be constructed to a height of 160 feet above tide, making them about 13 feet average height. The soil on which the reservoir would be placed is of a very retentive character, and well adapted to the purpose. Extra pipes would be set in the influent and effluent chambers, for future increase in the capacity of the works.

For the upper service, water would be taken from the influent chamber of the distributing reservoir, and forced by two pumping engines, having a pumping capacity of 1,000,000 gallons each in 16 hours, into the high-service system, and connected by means of a twenty inch main, 1,800 feet long, with the high-service reservoir on East Turnpike, opposite Doyle Avenue, already described.

TEN-MILE RIVER PLAN.

It is proposed to take the water from this river at a point about a thousand feet below the Omega Dam, above which the drainage-area of the river, as estimated from the Massachusetts state map, is fifty-three square miles. We have assumed that a drainage-area of thirty-four square miles is sufficient for a full supply of the quantity we require, and might therefore have no question as to the capacity of this stream. But to ascertain whether in this case any exception to our rule could be expected, a careful inspection was made of the territory through which the

river runs, and measurements of the actual summer-flow were taken. From the character of the country drained I should expect this river to have a more than ordinarily uniform rate of flow, and therefore to give more than an average quantity of water in a dry season. The area of reservoirs held under control by the mill-owners for supply during the dry season, is believed to be about six hundred acres, to which we should add a storage reservoir of about one hundred and twenty-two acres. Finding in this respect a favorable result, we proceeded to an examination at Lebanon Mills to ascertain the quantity of water actually running at a dry time. The results obtained there are believed to be reliable, and were sustained by facts learned at all the mills on the stream.

By the courtesy of R. B. Gage, Esq. supt., we were allowed to examine the books of the Company, in which the condition of the business of the mill during the year is indicated, and with his assistance the following results were obtained.

During the summer and autumn of 1865, the demand for their manufactures was great, and the mills were run over time; all the machinery being used, and the speed-gates fully open, whenever sufficient water to drive the wheels could be obtained. When short of water, such machinery was run as could be driven by the supply, and the hands not occupied were dismissed; a record being kept daily of the number of hours each worked. From this account it appears that a full supply of water was had until through July: but in August it was short on $3\frac{1}{2}$ days; in September $1\frac{1}{2}$ days; in October 14 days, and in November 6 days: making a total of $25\frac{1}{2}$ days, or one quarter of the time. During this time when the mill was short of water, Mr. Gage thinks that one-half enough to drive the mill ran in the stream during the day, and that the same amount ran by on Sundays.

By measurement of the quantity of water required by this mill, made on June 4th, 1867, it was found that with the speed-gates open, and all the machinery running, the wheels passed 95.4 cubic feet of water per second.

Applying this quantity to the experience of 1865, and taking the driest month, October, when during fourteen days water was short, we have the following result:—

95.4 cub. ft. per sec. passing 12 days,	1,144.3 cub. ft.
47.7 " " " 19 "	906.3 "
	<hr/>
	31)2,051.1 "

or an average of 66.2 "
per second. In this estimate no account is taken of the water passing in the night by leakage or otherwise.

This quantity was used during eleven hours of the twenty-four, amounting to a daily quantity of 19,608,970 gallons.

The drainage-area above Lebanon Mills is estimated at forty square miles, and above the point at which water would be taken for the city, at fifty-three square miles; hence the daily quantity of water to be expected at the latter point at the same time is 25,981,883 gallons. I think the rain-fall for the four months preceding October, may be supposed to affect the quantity running during that month. In 1865, the amount of rain-fall for this time was 6.4 inches, or less than one-half the average, and only about seven-tenths of that for the same four months of the preceding dry year of 1864. I believe that during the thirty-six years in which Prof. Caswell has kept his valuable records, there has been no time in which so little rain fell in four months together, as in the four months of 1865 referred to, except in three cases, as follows: July to October, 1836, the same months in 1837, and December, 1838, to March, 1839. Concluding, then, that so dry a month as October, 1865, is very rare, and finding in that month a larger quantity of water running than the minimum we have assumed to be collectable from an equal drainage-area, which accords with our expectation from the character of the adjoining country, it seems to be entirely safe to rely upon this river to deliver in the driest time about double the quantity of water for which the works are to be constructed.

The analysis by Prof. Appleton shows the amount of impurity to be 2.7 grains in an American gallon, and the hardness to be 0.3 of one degree.

The plan of works proposed was concluded upon after careful examination, and is briefly as follows:—

A storage reservoir having a water area of about a hundred and twenty-two acres, and containing a full supply for thirty

days, would be constructed immediately below Hunt's Falls, to render our supply entirely independent of the operations of the manufacturers on the river. The high-water level in this reservoir would be twenty-four feet above high tide, and the low-water level twelve feet above.

Provision is made for turning the water of freshets and all the water not required for the city supply, into Runin's River.

The filter beds, four in number, would be located near the westerly end of the reservoir, across the bed of the stream. After passing through these beds, the water would flow in the natural channel of the stream (which would be cleared of all vegetable deposits, to fit it for the purpose), to the Cove reservoir, formed by constructing an embankment at a suitable point about a thousand feet below Omega Mills; in which high water would be twelve feet above mean high tide, and low water would be at zero: the area being sixteen acres.

From this reservoir the water would be conducted through an open canal, about a thousand feet, to an effluent chamber situated two hundred feet from the shore-line of Seekonk River; thence two iron pipes three feet in diameter would conduct the water to the shore, and thence across the river a distance of twenty-five hundred feet in a trench dredged out for the purpose, and a distance of one hundred and fifty feet from the west shore to the influent chamber of a small reservoir formed by an embankment across the ravine at Blackstone Park. The area of this reservoir would be three acres, and the high-water level twelve feet. At its westerly end would be placed two pumping engines, each having a pumping capacity of 6,000,000 gallons in 16 hours, to force the water through two rising mains of three feet diameter and 6,000 feet length, running in a westerly direction, passing south of Dexter Asylum and through Hope Street to the influent chamber of the low-service distributing reservoir. The reservoir at this point would differ from that already described for the Scott's-Pond plan, only in arrangement.

Water would be delivered at Butler Hospital, or at the North Burial-ground, at an available height of about 152 feet above high tide; at the old city-line on Greenwich Street, at a height of 148 feet; at the new city-line on that street, at 143½ feet.

The plan and construction for the high service would also be substantially similar to that of the Scott's Pond plan.

THE PAWTUXET RIVER PLAN.

From this river it is proposed to take the water, at a point about three-fourths of a mile above the mouth of Pochasset River, nearly opposite the highway leading towards the Pawtuxet from Sockanossett Hill.

No examination of the river was made with a view of taking the water below Pochasset River, on account of the great amount of coloring matter turned into that stream from the print-works of the Messrs. Sprague, which, at times, is sufficient to fill the air with odors at some distance from the point where it empties into the Pawtuxet, and always, so far as I know, renders the water quite opaque. Though this was thought a sufficient reason for discarding the waters below this point, as a source of supply, yet we have in the quality of water at Pawtuxet Dam, as analyzed by Prof. Chace, a striking illustration of the rapidity with which impurities are dispersed in running waters.

With the Bell Font Mills, the Mills of Bowen & Battey, and the Print Works of Messrs. Sprague, in full operation, he found the quality at Pawtuxet Dam to be as follows:— [Reduced to Am. gallons.]

Mineral matters,	1.00 grains per gallon.
Organic “	1.2 “ “ “
Total Impurity,	3.11 “ “ “

A part of this impurity was in suspension.

The analysis was made for the American Wood Paper Co., and was kindly furnished by them.

As a further confirmation of the good quality of this water, I am told that water-boats are sometimes taken to the Pawtuxet Dam, to obtain a supply of water for vessels going to sea.

But we are seeking for water as to the purity of which there

can be no question ; and the specimens taken for analyses by Prof. Appleton were all from the river between the mouth of the Pochasset and the Pontiac Mills.

An average of several specimens gives the following result : —

Mineral matters,	1.11 grains.
Organic and Volatile,	1.2 " "
Total impurity in Am. gallon,	2.4 " "

This is the purest water we have found during this examination ; and it is purer than that supplied to any city of which I happen to have record.

It has been suggested that a canal, or conduit, be constructed to take water from above the Pontiac Dam, and lead it to a suitable place for a pumping-station, so as to lessen the head on the pumping-engines, and to gain other supposed advantages ; but, on examination, I find this would cause an extra cost of more than \$200,000 beyond the value of any advantages to be obtained:

A very careful examination was made of that part of the river lying below the Pontiac Mills and above Pochasset River ; and the point selected is believed to be the most favorable for our purpose. The drainage-area above this point is about 192 square miles, as estimated from the map of Rhode Island.

Here the foundation and sides of a dam would be constructed, which in time of freshet would allow as free a passage of water as at present, but to which, in time of drought, flash-boards may be added, to maintain the surface of the water at a convenient height between the banks. At the westerly end of the dam would be located the screens and head-gate of a conduit four feet in diameter, leading a distance of 1200 feet to the pump-well. At this point two pumping engines, each having a pumping capacity of 6,000,000 gallons in 16 hours, would be located, to force the water through the three-feet rising-mains, 4700 feet in length, on a constant ascent, to the influent chamber of the reservoir and filter beds on Sockanossett Hill. Here the high-water surface would be at a height of 176 feet above high tide in the receiving portion of the reservoir and over the filter beds, and at a height of 174 feet in the distributing portion. The water-area of the reservoirs would be about 9 acres, and that

of the filter beds, four in number, 3 1-2 acres. The water of the receiving reservoir and filter beds would be drawn 10 feet, and the distributing reservoir 15, the available capacity being about forty-seven million gallons, or a supply for nearly four days. The location is favorable for a reservoir, and for possible future extensions. The earth is retentive, and the water-table lies quite near the surface.

The general arrangement and construction of reservoir and filter beds would be similar to that proposed for the Pawtucket Plan. From the effluent chamber, two three-feet pipes would lead the water to the city, a distance of 22,900 feet, for distribution. The water would be delivered at the new city-line, on Greenwich Street, at an available height of 166 1-2 ft.; at the old city-line, on Greenwich Street, at a height of 162 feet; at the Butler Hospital at a height of 150 feet above high tide.

The water for the upper service would be taken from a main distributing pipe on Olney Street, opposite Hope Street, by two pumping engines, of a capacity to raise 1,000,000 gallons each in 16 hours, and forced directly into the system for high service, connecting with the high-service reservoir, as in other plans.

DISTRIBUTION.

The plan for distribution is arranged for a consumption of twelve million gallons in twenty-four hours, within the old city limits, and for an additional consumption of five million gallons in the territory added to the city during the present year.

The quantity required by the manufacturing and more densely populated districts is assumed to be double, per square foot, the quantity required in the other sections of the city.

The sizes of the pipes are so proportioned as to convey the required quantity of water to the several districts, during those hours of the day in which there is greatest consumption, with a velocity giving a uniform loss of head of one foot in a length of two thousand feet, the pipes being of cast iron, coated with coal-pitch varnish.

The average available height of water in the low service of the city, by the various plans, would be about as follows: —

Pawtucket,	149 feet.
Scott's Pond,	151 "
Ten Mile,	151½ "
Pawtuxet,	158 "

The estimates of cost of distribution include nearly all the mains that will be needed to supply the full amount of water for which the works are designed, and such service-pipes as will supply, in the most liberal manner, all the streets in the city which are graded and occupied, excepting only a few in which the houses are widely scattered.

At all points in the more densely populated parts of the city, the pipes are large enough, at the least, to supply steam fire-engines with three thousand gallons of water per minute, and two thousand gallons per minute in the outskirts. This requires larger pipes in some cases than would be needed for the ordinary supply of the city.

The mains are so distributed and arranged that any accident occurring to one would not be likely to affect another connection with the reservoir; and if one should be cut off temporarily for repairs, the others would still give a sufficient supply to all parts of the city.

All the proposed plans, except perhaps the Pawtucket, promise to be so entirely satisfactory in supplying the city with the desired quantity of pure water, that there is little ground for choice between them.

Independently of the cost, I should choose the Pawtuxet River, as, on the whole, the most satisfactory source of supply. The water is, to the eye, remarkably clear and limpid. Its whole drainage-area is within the State of Rhode Island, and under control of State legislation. I think it is less likely than the other rivers to receive impurities, in the future, from the surrounding country; and the pumping-station would be near a native bed of coal, which might probably be used with great economy. But, on the other hand, the Pawtuxet plan would be more expensive than any other; and, as between that and the Scott's-Pond plan,

it seems to me the question of economy may fairly govern the choice.

The true comparison, in point of economy, is of future annual expense, including interest on the construction account. In this comparison, the Scott's-Pond plan stands first among all the plans; and I think this source compares favorably with the others in nearly all respects. The water is, by chemical test, unexceptionable. Scott's Pond is a better settling-basin than we could have by any other plan. The city would probably never require more than a small fraction of the whole flow of the Blackstone. The river runs for more than twelve miles in territory under control of the Rhode-Island Legislature; a distance sufficient, undoubtedly, for the necessary exposure to sun and air for the dispersion of any impurities which would be received above the State line. The filter beds are near the settling-basin; and the water would be passed directly from them into the close conduit leading to the pumps. The height of pumping would be about fifty feet less than by either of the other plans.

Making economy an essential feature, and assuming that reasonable arrangements can be made with parties interested, for their compensation, I give to the Scott's-Pond plan my first preference.

Between the Pawtuxet and the Ten-mile-River plan, the following brief comparison may be made:—

1st. The Pawtuxet has, compared with the quantity we propose to take, a large volume of water coming from a large surface area, and having time for the dispersion of impurities. In the Ten-mile-River plan, the entire flow of the river may be required to supply the city at some future time.

2d. The works of the Pawtuxet plan are all under control, and within reach for repairs. The Ten-mile-River plan requires pipes under the Seekonk River, which could not be inspected nor repaired except at great cost.

3d. The Pawtuxet plan has native coal very near the pumping-station.

4th. In proportion to the quantity of water required, there seems likely to be very little impurity added to the Pawtuxet River by the future increase of population. The Plains near our

proposed works on the Ten-mile River may at some future time be the highly manured market-gardens for Providence and the neighboring towns.

5th. The chances of permanency of works are in favor of the Pawtuxet plan.

6th. The works of the Pawtuxet plan are more simple and more compact.

7th. The water of the Pawtuxet is generally clearer than that of any other river with which I am familiar.

In view of the greater abundance of supply, purity of water, and permanence of works, I give preference to the Pawtuxet plan.

The Pawtucket plan requires more pumping-machinery than the other plans, on account of the necessity for raising during the working-hours at the mills all the water required for the day. The probability is, that this water will hereafter become more impure than that of either of the other sources. I therefore place this source last in the list, which then stands as follows : —

SCOTT'S POND,
PAWTUXET,
TEN-MILE RIVER,
PAWTUCKET.

It is not necessary in either plan to construct at first all those parts of the works that are essential to their final efficiency and security. To indicate the expenditure necessary to supply six million gallons of water daily, with provision for a ready enlargement of the works so as to supply twelve million gallons daily, I have prepared an approximate estimate for each plan with the following result : —

First cost of the Scott's-Pond plan,	. . .	\$1,123,990
" " " Pawtuxet "	. . .	1,253,598
" " " Ten-mile-River "	. . .	1,175,738
" " " Pawtucket, "	. . .	1,103,989

This estimate does not include the cost of distribution, which may be gradually extended according to the demand. The filter-beds are omitted, as well as one engine, and one force-main from each plan, and one leading-main from the Pawtuxet and

Pawtucket plans. In the high-service system, both pumping engines are retained, so that the water may be pumped into the system of distribution for constant supply, and thus enable us for the present to dispense with the high reservoir, which is omitted from the above estimates.

In this report, and in the accompanying estimates, I have made no account of water-power as a means of raising our required supply to the necessary height, for the principal reason that there is not sufficient power available on any stream for the purpose.

The total available water-power of the Blackstone River on the fifteen-feet fall at Pawtucket is probably not more than 550 horse-powers, in a dry time; while 779 horse-powers would be required to raise twelve million gallons per day, by our Pawtucket plan.

I have not the means of knowing so definitely the amount of water flowing in the Pawtuxet River. From statements given by parties at the Pontiac Mills, it appears that the amount of water-power, in the spring months, is about 200 horse-powers, on six to seven feet head and fall. The greatest available fall which we could get on the Pawtuxet River would be ten feet, on which this estimated flow of the river would be about 308 horse-powers. The power was said to be poor in a dry time; but the amount was not known. If we assume that the proportion between the power of the Pawtuxet River and that of the Blackstone is in the ratio of their drainage-areas, we should have in a dry time about 290 horse-powers on a fifteen-feet fall in the Pawtuxet River, — equal to about 193 horse-powers on a ten-feet fall. But the amount of power to be obtained from the Pawtuxet, even in the spring months, is much less than half the power required to raise the city supply by the Pawtuxet plan; that being 863 horse-powers.

It is cheaper to run water-power than steam-power; but it would be very easy to make the whole cost of water-power greater by paying a high price for it. The waters of the Blackstone and Pawtuxet are fully developed; and, if they should be taken for the use of the city, the damages could hardly be less

than the cost of maintaining equivalent steam-power, which may as well be done for the city as for the mill-owners.

The average yearly cost of pumping at the Brooklyn water-works, where the water is raised to a height of 170 feet, for the three years 1860 to '62, inclusive, was about \$72.00 per horse-power. For the four years 1863 to '66, inclusive, when coal was very high, the average yearly cost was about \$100.00 per horse-power. The usual yearly rental of water-power and room in the neighborhood of Providence, I am told, is \$100.00 per horse-power.

Steam-pumping is the ordinary means of raising water for city supply. The most noted exception is at Philadelphia, where a part of the water is raised by water-power; but, even there, a considerable portion is raised by steam-pumps; and the works are at present being increased by additions to the steam-pumping machinery.

Accompanying this report will be found estimates of the cost of complete works by each of the proposed plans, and a sketch of the vicinity of Providence showing the location of the works and profiles of the conduits, force-mains, and leading-mains.

I also append the report of the Clerk of Police giving statistics obtained by city officers for our use, which illustrate in many ways the need of an abundant supply of pure water.

The valuable table of monthly and annual rain-fall, made up from the notes of President Caswell, kindly furnished by him for the purpose, will be interesting to many.

In conclusion, I beg leave to thank the members of the committee personally for the kindness, patience, and courtesy with which they have uniformly facilitated my labors.

Respectfully submitted,

J. HERBERT SHEDD, *Engineer.*

APPROXIMATE ESTIMATE

OF THE COST OF WATER-WORKS PROPOSED FOR THE CITY OF
PROVIDENCE.

BY THE SCOTT'S POND PLAN.

1. *Head-Gates. — Leading Pipes. — Canal and Filter Beds.*

12,538 cubic yards concrete, at	\$ 8.00	\$100,304.00
8,306 " " rubble in cement,	10.00	83,060.00
252 " " coping,	25.00	6,300.00
43,379 " " excavation put into embankment,	.25	10,844.75
17,893 " " " " wasted,	.25	4,473.25
545 feet of 30 inch cast-iron pipe,	17.00	9,265.00
180 " 36 " "	22.00	3,960.00
280 " 48 " "	28.50	7,980.00
270 " 12 " drain-pipe,	1.00	270.00
300 " 20 " "	2.00	600.00
9,290 " drain-pipe 3 to 12 inches in diameter,		2,063.00
9,960 cubic yards of broken stone,	3.50	34,860.00
5,976 " " coarse sand,	.60	3,585.60
9,960 " " fine sand,	.60	5,976.00
Gates, slides, and gearing,		6,000.00
Cut stone at gate openings,		1,500.00
400 square feet of copper screens,	1.50	600.00
25 piles driven,	6.00	150.00
Supports for pipes,		100.00
Gate house,		1,200.00
2,500 feet of fencing,	.30	750.00
Contingencies and omissions (10 per cent),		28,384.16
		<hr/> \$312,225.76

2. — *The Conduit from Filter Beds to Pump-well.*

17,784 feet in length of 4 feet cast-iron pipe laid at	\$28.50	\$506,844.00
190 cubic yards paving in culverts,	8.00	1,520.00
289 " side walls in cement,	10.00	2,890.00
116 " arches,	15.00	1,740.00
173 " face work rough-hewn joints,	17.00	2,941.00
7 M. feet B. M. timber,	70.00	490.00
Carried forward,		<hr/> \$516,425.00

Brought forward,		\$516,425.00
33,224 cubic yards of embankment,	\$.50	16,612.00
13,000 " excavation and back filling, not included in price for laying pipe,	.50	6,500.00
Shoring and extras at deep cuts,		2,000.00
25,000 feet of fencing,	.20	5,000.00
Contingencies and omissions,		54,653.70
		<hr/> \$601,190.70

3. — *The Pump-well and Engine House.*

1,205 cubic yards coursed rubble masonry, at	\$12.00	\$14,460.00
600 " rubble in cement,	10.00	6,000.00
52 " cut-stone in invert,	30.00	1,560.00
Other cut stone work,		1,500.00
1,953 cubic yards excavation and grading,	.50	976.50
Gates and gearing,		2,000.00
Screens,		450.00
Engine and boiler-house superstructure,		20,000.00
Contingencies and omissions,		4,694.65
		<hr/> \$51,641.15

4. — *The Pumping Engines.*

Two pumping engines with boilers and all appur- tenances put up ready for work,	\$128,000.00
Contingencies (10 per cent),	12,800.00
	<hr/> \$140,800.00

5. — *Force Mains to Service Reservoir.*

3,700 feet of two lines of 36 inch pipe, at	\$45.00	\$166,500.00
Two check-valves,		6,000.00
Six stop-cocks,		12,800.00
Extra for special castings and branches,		2,000.00
Contingencies and omissions (10 per cent),		18,730.00
		<hr/> \$206,030.00

6. — *The Service Reservoir.*

68,500 cubic yards of excavation put into embank- ment, at	\$.40	\$27,400.00
7,195 " " " " puddle wall,	1.00	7,195.00
22,810 " puddle on bottom,	1.00	22,810.00
Carried forward,		<hr/> \$57,405.00

Brought forward,		\$57,405.00
4,898 cubic yards excavation wasted,	\$.30	1,469.40
4,000 " dry paving on slopes,	5.00	20,000.00
1,284 " rubble in cement,	10.00	12,840.00
416 " rough granite in cement,	12.00	4,992.00
174 " dimension granite,	15.00	2,610.00
38 " coping,	25.00	950.00
27 " paving in cement,	8.00	216.00
3 outlet and 3 inlet pipes set,		2,400.00
100 feet of 12 inch iron pipe,	4.00	400.00
3 sluice gates 4 feet X 4 feet; 4 do. 3 feet X 4 feet; 2 do. 1½ feet X 1½ feet,		4,000.00
400 feet of drain-pipe,	1.00	400.00
Stone cutting,		2,000.00
4,000 feet of fencing,	.60	2,400.00
Gate-house,		1,200.00
13,500 square yards soiling and seeding of slopes,	.07	945.00
Contingencies and omissions (10 per cent),		11,422.74
		<hr/>
		\$125,650.14

THE UPPER SERVICE.

7. — *Engine House and Engine Foundations.*

50 feet of 36 inch pipe from influent chamber of service reservoir to pumping station.		\$1,200.00
451 cubic yards of rubble in cement,	\$10.00	4,510.00
39 " brick work,	15.00	585.00
31 " cut stone masonry,	25.00	775.00
Engine and boiler house superstructure,		15,000.00
Contingencies and omissions (10 per cent),		2,207.00
		<hr/>
		\$24,277.00

8. — *High-Service Pumping Engines.*

Two pumping engines with boilers and all appurtenances in place, ready for work,		\$28,000.00
Contingencies (10 per cent),		2,800.00
		<hr/>
		\$30,800.00

9. — *Force-Main for Upper Service.*

1,800 feet in length of 20 inch force-main leading to upper reservoir, at	\$9.00	\$16,200.00
Four stop-cocks,		2,000.00
Extra for special castings and branches,		750.00
Contingencies and omissions (10 per cent),		1,895.00
		<hr/>
		\$20,845.00

10. — *The Upper Reservoir.*

2,205 cubic yards of rubble wall in cement at	\$10.00	\$22,050.00
2,025 " granite, cut joints,	25.00	50,625.00
249 " granite dimension,	15.00	3,735.00
182 " cut stone arches,	30.00	5,460.00
759 " rough stone arches,	15.00	11,385.00
2,209 " concrete,	8.00	17,672.00
309 " coping,	25.00	7,725.00
2,700 " excavation and grading,	.50	1,350.00
100 feet of waste pipe,		1,000.00
1,000 feet of fencing,		600.00
Contingencies and omissions (10 per cent)		12,160.20
		<hr/> \$133,762.20

SUMMARY.

1. Head gates, leading pipes, canal, and filter beds,	\$312,225.76
2. The conduit,	601,190.70
3. The pump-well and engine-house,	51,641.15
4. The pumping engines,	140,800.00
5. The force-mains,	206,030.00
6. The service reservoir,	125,650.14
7. The upper service engine-house, &c.,	24,277.00
8. " " pumping engines,	30,800.00
9. " " force-main,	20,845.00
10. " " reservoir,	133,762.20
Land and damages less value of height for pumping (for comparative estimate),	1,477.00
Distribution,	1,912,324.70
Engineering and office expenses,	125,000.00
Total,	<hr/> \$3,686,023.65

BY THE PAWTUXET PLAN.

1. *Dam and Conduit from Pawtuxet River to Pump-well.*

7,707 cubic yards, excavation and back-filling,	\$.50	\$3,853.50
1,938 " " embankment,	.40	775.20
231 " " puddle,	1.50	346.50
Coffer-dam,		1,000.00
798 cubic yards coursed rubble in cement,	12.00	9,576.00
53 " " cut granite (piers &c.),	25.00	1,325.00
100 " " paving,	5.00	500.00
20 " " coping,	25.00	500.00
Head-gate and gearing,		1,000.00
1,200 feet of 4 feet iron pipe,	23.50	34,200.00
Screens (copper and wood),		900.00
Sheet-piling,		2,600.00
Planking,		1,256.00
Timber,		360.00
Pumping,		500.00
Flash-boards and irons,		200.00
Gate-house,		1,500.00
Contingencies and omissions (10 per cent),		6,039.22
		<hr/>
		\$66,431.42

2. *Pump-well, Engine-house, and Coal-shed.*

1,352 cubic yards of coursed rubble,	\$12.00	\$16,224.42
651 " " " rubble in cement,	10.00	6,510.00
19 M. feet B. M. Timber under foundations,	60.00	1,140.00
3,111 cubic yards of excavation,	.50	1,555.50
Pumping,		2,000.00
Cut stone work,		2,000.00
Gates and gearing,		2,000.00
Engine-house and coal-shed superstructure,		20,000.00
Contingencies and omissions (10 per cent),		5,142.95
		<hr/>
		\$56,572.45

3. *The Pumping Engines.*

Two pumping engines, with boilers and all appurtenances put up ready for work,	\$150,000.00
Contingencies (10 per cent),	15,000.00
	<hr/>
	\$165,000.00

4. *Force-mains.*

4,700 feet in length of two lines of 36 inch pipe of varying thickness, laid at	\$45.00	\$211,500.00
4,323 cubic yards of embankment,	.40	1,729.20
61 " " " masonry in culverts,	12.00	732.00
Two check-valves,		6,000.00
Six stop-cocks with vaults,		12,800.00
Extra for special castings and branches,		1,000.00
Contingencies and omissions (10 per cent),		23,376.12
		<hr/> \$257,137.32

5. *Reservoirs and Filter Beds on Sockanossett Hill.*

14,422 cubic yards of concrete,	\$ 8.00	\$115,376.00
11,398 " " " rubble wall,	10.00	113,980.00
350 " " " coping,	25.00	8,750.00
108,323 " " " excavation into embankment,	.40	43,329.20
35,157 " " " puddle in walls and bottom,	1.00	35,157.00
3,660 " " " dry paving on slopes,	5.00	18,300.00
10,000 lineal feet of drain-pipe, 8 to 12 inch,		2,250.00
10,667 cubic yards of broken stone,	3.50	37,334.50
6,400 " " " coarse sand,	.60	3,840.00
10,667 " " " fine sand,	.60	6,400.20
Cut stone,		2,000.00
Gates and gearing,		6,000.00
4,500 feet of fencing,	.30	1,350.00
2,000 " road,	.75	1,500.00
20,000 square yards soiling and seeding slopes,	.07	1,400.00
Contingencies and omissions (10 per cent),		39,696.69
		<hr/> \$486,663.59

6. *Leading-mains.*

22,900 feet of two lines of 36 inch cast-iron pipe,	\$44.00	\$1,007,600.00
Blow-off and air-cocks,		5,000.00
Stop-cocks,		20,000.00
Branches and extra castings,		5,000.00
Bridge across Pochasset River,		4,146.00
Embankments,		5,058.00
Culverts,		2,786.00
1,500 feet of 24 inch main from North-Main Street to pumping station,	12.00	18,000.00
Two stop-cocks,		900.00
Contingencies and omissions (10 per cent),		106,849.00
		<hr/> \$1,175,339.00

THE UPPER SERVICE.

7. *Engine-house and Engine-foundations.*

451 cubic yards of rubble in cement,	\$10.00	\$4,510.00
39 " " " brick work,	15.00	585.00
31 " " " cut stone masonry,	25.00	775.00
Engine and boiler house superstructure,		15,000.00
Contingencies and omissions (10 per cent),		2,087.00
		<hr/>
		\$22,957.00

8. *High-service Pumping Engines.*

Two pumping engines with boilers and appurtenances in place,		\$30,000.00
Contingencies (10 per cent),		3,000.00
		<hr/>
		\$33,000.00

9. *Force-main for Upper Service.*

1,900 feet in length of 20 inch force-main, leading to upper reservoir,	\$9.00	\$17,100.00
Four stop cocks,		2,000.00
Extra for special castings and branches,		750.00
Contingencies and omissions (10 per cent),		1,985.00
		<hr/>
		\$21,835.00

10. *The Upper Reservoir.*

2,205 cubic yards of rubble wall in cement,	\$10.00	\$22,050.00
2,025 " " " granite, cut joints,	25.00	50,625.00
249 " " " " dimension,	15.00	3,735.00
182 " " " in cut stone arches,	30.00	5,460.00
759 " " " rough stone arches,	15.00	11,385.00
2,209 " " " concrete,	8.00	17,672.00
809 " " " coping,	25.00	7,725.00
2,700 " " " excavation and grading,	.50	1,350.00
100 feet of waste pipe,		1,000.00
1,000 " fencing,	.60	600.00
Contingencies and omissions (10 per cent),		12,160.20
		<hr/>
		\$133,762.20

SUMMARY.

1. Dam and conduit,	\$66,431.42
2. Pump-well, engine-house, &c.,	56,572.45
3. The pumping engines,	165,000.00
	<hr/>
Carried forward,	\$288,003.87

Brought forward,	\$288,008.87
4. The force-mains,	257,137.32
5. Reservoirs and filter beds,	486,663.59
6. Leading-mains,	1,175,339.00
7. Upper-service, engine-house, &c.,	22,957.00
8. " pumping engine,	33,000.00
9. " force-main,	21,835.00
10. " reservoir,	133,762.20
Lands and damages,	52,550.00
Distribution,	1,930,787.10
Engineering and office expenses,	125,000.00
	<hr/>
	\$4,477,035.08

BY THE TEN-MILE RIVER PLAN.

1. — *The Storage Reservoir.*

184,197 cubic yards of mud and vegetable matter to be removed from the site, at	\$.50	\$92,098.50
62,407 cubic yards of embankment,	30	18,722.10
1,304 " " " puddle in embankment,	1.50	1,956.00
2,455 " " " pavement on slopes,	5.00	12,275.00

WASTE-WAY AT SOUTH END OF RESERVOIR.

173 cubic yards of cut stone masonry, at	\$25.00	\$4,325.00
107 " " " dry granite, rough hewn,	12.00	1,284.00
56 " " " water tight rubble in cement,	10.00	560.00
100 " " " dry rubble backing,	6.00	600.00
274 " " " rock excavation,	2.00	548.00
190 " " " earth excavation,	.30	57.00
12,800 " " " excavation to drain reservoir into Runin's river,	.40	5,120.00
4 waste gates with slides and gearing,		2,000.00

BRIDGE ON TURNPIKE.

25,841 cubic yards of embankment, at	\$.30	\$7,752.30
435 " " " masonry in abutments,	8.00	3,480.00
80 feet in length of bridge,	40.00	3,200.00
2,250 feet of 12 inch drain-pipe around west em- bankment,	1.00	2,250.00
15,000 feet of post and rail fence,	.20	3,000.00
Contingencies and omissions (10 per cent),		15,922.79
		<hr/> \$175,150.69

2. — *Effluent Chamber and Filter Beds.*

759 cubic yards of concrete, at	\$8.00	\$6,072.00
5,185 " " " rubble wall in cement,	10.00	51,850.00
35 " " " rubble arch, "	15.00	525.00
106 " " " coping,	25.00	2,650.00
53 " " " cut granite in piers,	25.00	1,325.00
106 " " " granite dimension,	15.00	1,590.00

Carried forward, \$64,012.00

Brought forward,		\$64,012.00
19,556 cubic yards of excavation,	\$.40	7,822.40
9,960 " " " broken stone,	3.50	34,860.00
5,976 " " " coarse sand,	.60	3,585.60
9,960 " " " fine sand,	.60	5,976.00
9,290 lineal feet of drain pipe 3 to 12 inch,		2,063.00
1,722 square yards of seeding and soiling of slopes,	.07	120.54
Gates with slides and gearing,		4,000.00
Cut stone at 13 sluice openings,		1,300.00
6 copper screens covering 420 square feet,	1.50	630.00
Contingencies and omissions, (10 per cent),		12,486.95
		<hr/> \$136,806.49

3. — *The Cove Reservoir.*

36,468 cubic yards of mud and vegetable matter to be excavated, at	\$.50	\$18,234.00
32,587 cubic yards of earth embankment,	.50	16,268.50
2,785 " " " puddle wall in embankment,	1.50	4,177.50
784 " " " dry paving on slopes,	5.00	3,670.00

EFFLUENT CHAMBER.

95 cubic yards granite dimension with cut beds and builds,	\$25.00	\$2,375.00
4 cubic yards of coping,	25.00	100.00
67 " " " rough granite in cement,	12.00	804.00
238 " " " rubble in cement,	10.00	2,330.00
46 " " " paving "	8.00	368.00
5,015 " " " excavation and back-filling,	.50	2,507.50
400 lineal feet of 36 inch pipes,	22.00	8,800.00
Contingencies and omissions (10 per cent),		5,963.45
		<hr/> \$65,597.95

4. — *Pipes across Seekonk River*

31,000 cubic yards of dredging, at	\$.50	\$15,500.00
1,200 piles driven,	5.50	6,600.00
25 M. feet B. M. of lumber in cross timbers and staging,	60.00	1,500.00
Lowering apparatus and lowering,		12,000.00
5,000 lineal feet of 36 inch pipe put together,	20.00	100,000.00
300 " " " " laid,	22.00	6,600.00
Contingencies and omissions (15 per cent),		21,330.00
		<hr/> \$162,530.00

5. — *The Park Reservoir.*

25,810 cubic yards of excavation to be put into embankment, at	\$.50	\$12,655.00
2,220 cubic yards of puddle in embankment,	1.50	3,330.00
Influent chamber, same as effluent chamber of Cove Reservoir,		8,484.50
450 feet of 12 feet piling, 6 inches thick, 32.4 M. feet B. M. driven,	70.00	2,268.00
900 cubic yards of dry paving on slopes of embankment,	5.00	4,500.00
The filter dam across the brook,		1,500.00
Contingencies and omissions (10 per cent),		3,273.75
		<hr/> \$36,011.25

6. — *Engine House and Engine Foundations.*

1,352 cubic yards of coursed rubble, at	\$12.00	\$16,224.00
790 " " " rubble in cement,	10.00	7,900.00
19 M. feet B. M. timber under foundations,	60.00	1,140.00
800 cubic yards of excavation,	.50	400.00
Cut stone work,		2,000.00
Gates and gearing,		2,000.00
Engine and boiler house superstructure,		20,000.00
Screens,		450.00
Contingencies and omissions (10 per cent),		5,011.40
		<hr/> \$55,125.40

7. — *The Pumping Engines.*

Two pumping engines, including boilers and all appurtenances, put up ready for work,	\$140,000.00
Contingencies and omissions,	14,000.00
	<hr/> \$154,000.00

8. — *Force-Mains to Service Reservoir.*

6,000 feet in length of two lines of 36 inch pipe laid, at \$45.00	\$270,000.00
Two check-valves,	6,000.00
Six stop-cocks with vaults,	12,800.00
Extra for special castings and branches,	2,000.00
Extra excavation for mains,	200.00
4 feet culvert 35 feet long,	800.00
Contingencies and omissions (10 per cent),	29,180.00
	<hr/> \$320,980.00

9. — *Service Reservoir on Hope Street.*

68,500 cubic yards of excavation put into embankment, at	\$.40	\$27,400.00
7,195 cubic yards of excavation put into puddle wall,	1.00	7,195.00
22,810 " " " puddle on bottom,	1.00	22,810.00
4,898 " " " excavation wasted,	.30	1,469.40
4,000 " " " dry paving on slopes,	5.00	20,000.00

INFLUENT AND EFFLUENT CHAMBERS.

1,284 cubic yards rubble wall in cement, at	\$10.00	\$12,840.00
416 " " rough granite "	12.00	4,992.00
174 " " dimension granite,	15.00	2,610.00
38 " " coping,	25.00	950.00
27 " " paving,	8.00	216.00
3 outlet and 3 inlet pipes set,		2,400.00
100 feet of 12 inch iron pipe,	4.00	400.00
3 sluice gates 4 feet x 4 feet, 4 do. 3 feet x 4 feet,		
2 do. 1½ feet x 1½ feet,		4,000.00
400 feet drain-pipe,	1.00	400.00
Stone cutting,		2,000.00
4,000 feet of fencing,	.60	2,400.00
2 Gate-houses,		2,000.00
13,500 square yards soiling and seeding,	.07	945.00
Contingencies and omissions (10 per cent),		11,502.70
		<hr/> \$126,530.14

THE UPPER SERVICE.

10. — *Engine House and Engine Foundations.*

50 feet of 36 inch pipe from influent chamber of service reservoir to pumping station,		\$1,200.00
451 cubic yards of rubble in cement,	\$10.00	4,510.00
39 " " " brick work,	15.00	585.00
31 " " " cut stone masonry,	25.00	775.00
Engine and boiler house superstructure,		15,000.00
Contingencies and omissions (10 per cent),		2,207.00
		<hr/> \$24,277.00

11. — *High-Service Pumping Engines.*

Two pumping engines with boilers and appurtenances in place,	\$28,000.00
Contingencies and omissions (10 per cent),	2,800.00
	<hr/> \$30,800.00

12. — *Force-Main for Upper Service.*

2,200 feet in length of 20 inch force-main, leading to upper reservoir, at	\$9.00	\$19,800.00
Four stop-cocks,		2,000.00
Extra for special castings and branches,		750.00
Contingencies and omissions (10 per cent),		2,255.00
		<hr/>
		\$24,805.00

13. — *The Upper Reservoir.*

2,205 cubic yards of rubble wall in cement, at	\$10.00	\$22,050.00
2,025 " " " granite, cut joints,	25.00	50,625.00
249 " " " " dimension,	15.00	3,735.00
182 " " " in cut stone arches,	30.00	5,460.00
759 " " " rough stone arches,	15.00	11,385.00
2,209 " " " of concrete,	8.00	17,672.00
309 " " " coping,	25.00	7,725.00
2,700 " " " excavation and grading,	.50	1,350.00
100 feet of waste-pipe,		1,000.00
1,000 feet of fencing,	.60	600.00
Contingencies and omissions (10 per cent),		12,160.20
		<hr/>
		\$133,762.20

SUMMARY.

1. The storage reservoir,	\$175,150.69
2. Effluent chamber and filter beds,	136,806.49
3. The Cove reservoir,	65,597.95
4. Pipe across Seekonk River,	163,530.00
5. The Park reservoir,	36,011.25
6. Engine-house and foundations,	55,125.40
7. The pumping engines,	154,000.00
8. The force-mains,	320,980.00
9. The service reservoir,	126,530.14
10. Upper-service engine-house,	24,277.00
11. " pumping engines,	30,800.00
12. " force-main,	24,805.00
13. " reservoir,	133,762.20
Lands and damages,	178,404.00
Distribution,	1,912,324.70
Engineering and office expenses,	125,000.00
	<hr/>
Total,	\$3,663,104.82

BY THE PAWTUCKET PLAN.

1. — *Head-gates and Flume.*

1,008 cubic feet of cut stone in arch, at	\$1.25	\$1,260.00
654 cubic yards of masonry with cut joints,	25.00	16,350.00
Coffer-dam above head-gates,		600.00
Cut stone work around gates,		800.00
Head gates and hoisting-apparatus,		2,000.00
Gates at head of outlet-flume.		600.00
Screens,		400.00
Contingencies and omissions (10 per cent),		2,201.60
		<hr/>
		\$24,211.00

2. — *Conduit from Flume to Pump-well.*

2,750 feet of 4 feet pipe, at	\$28.50	\$78,375.00
Extra excavation and supports,		5,000.00
Protection from water and ice,		2,000.00
Contingencies (10 per cent),		8,537.50
		<hr/>
		\$93,912.50

3. — *Pump-well and Foundations.*

1,352 cubic yards of coursed rubble in cement, at	\$12.00	\$16,224.00
651 " " " rubble in cement, at	10.00	6,510.00
19 M. feet B. M. timber under foundations,	60.00	1,140.00
1000 cubic yards of excavation, at	.50	500.00
Cut stone work,		2,000.00
Gates and gearing,		2,000.00
Screens,		450.00
Engine and boiler house superstructure,		20,000.00
Contingencies and omissions (10 per cent),		4,882.40
		<hr/>
		\$53,706.40

4. — *The Pumping Engines.*

Three pumping engines, with boilers and all appurtenances, put up ready for work,		\$210,000.00
Contingencies (10 per cent),		21,000.00
		<hr/>
		\$231,000.00

5. — *Force-Mains to Service Reservoir.*

2,200 feet in length of two lines of 36 inch iron pipe, at	\$45.00	\$99,000.00
Two check-valves,		6,000.00
Six stop-cocks,		12,800.00
Extra for special castings,		1,000.00
Extra excavation for mains,		300.00
Contingencies and omissions (10 per cent),		11,910.00
		<hr/> \$131,010.00

6. — *Reservoirs and Filter Beds.*

13,548 cubic yards of concrete, at	\$8.00	\$108,384.00
13,429 " " " rubble wall,	10.00	134,290.00
287 " " " coping,	25.00	7,175.00
106,875 " " " earth in embankments,	.40	42,750.00
39,832 " " " puddle in banks and bottom,	1.00	39,832.00
3,274 " " " dry paving on slopes,	5.00	16,370.00
10,000 feet in length of drain-pipe,		2,250.00
10,667 cubic yards of broken stone,	3.50	37,334.50
17,067 " " " sand,		10,240.20
Stone-cutting,		2,000.00
Gates and gearing,		6,000.00
4,500 feet of fencing,	.30	1,350.00
20,000 square yards soiling and seeding slopes,	.07	1,400.00
Contingencies and omissions (10 per cent),		40,937.57
		<hr/> \$450,313.27

7. — *Leading-Mains.*

10,900 feet of two lines of 36 inch cast-iron pipe, at	\$44.00	\$479,600.00
Blow-off and air-cocks,		2,000.00
Stop-cocks,		8,000.00
Branches and extra castings,		3,000.00
Culverts,		2,000.00
1,500 feet of 24 inch pipe from 36 inch mains to the high-service pumping station,	12.00	18,000.00
2 stop-cocks,		900.00
Contingencies and omissions (10 per cent),		51,350.00
		<hr/> \$564,850.00

THE UPPER SERVICE.

8. — *Engine-house and Engine Foundations.*

451 cubic yards of rubble in cement, at	\$10.00	\$4,510.00
39 " " " brick work,	15.00	585.00
31 " " " cut stone masonry,	25.00	775.00
Carried forward,		<hr/> \$5,870.00

Brought forward,	\$5,870.00
Engine and boiler house superstructure,	15,000.00
Contingencies and omissions,	2,087.00
	<hr/>
	\$22,957.00

9. — *High-Service Pumping Engines.*

Two pumping engines with boilers and all appurtenances in place,	\$30,000.00
Contingencies (10 per cent),	3,000.00
	<hr/>
	\$33,000.00

10. — *Force-main for Upper Service.*

1,900 feet in length of 20 inch force main, at	\$9.00	\$17,100.00
Four stop-cocks,		2,000.00
Extra for special castings and branches,		750.00
Contingencies (10 per cent),		1,985.00
		<hr/>
		\$21,835.00

11. — *The Upper Reservoir.*

2,205 cubic yards rubble wall in cement, at	\$10.00	\$22,050.00
2,025 " " granite, cut joints,	25.00	50,625.00
249 " " " dimension,	15.00	3,735.00
182 " " in cut stone arches,	30.00	5,460.00
759 " " " rough stone arches,	15.00	11,385.00
2,209 " " of concrete,	8.00	17,672.00
309 " " " coping,	25.00	7,725.00
2,700 " " " excavation and grading,	.50	1,350.00
100 feet of waste pipe,		1,000.00
1,000 feet of fencing,	.60	600.00
Contingencies and omissions (10 per cent),		12,160.20
		<hr/>
		\$133,762.20

SUMMARY.

1. Head-gates and flume,	\$24,211.00
2. Conduit to pump-well,	93,912.50
3. Pump-well and engine-house,	53,706.40
4. Pumping engines,	231,000.00
5. Force-mains,	131,010.00
6. Reservoirs and filter beds,	450,313.27
7. Leading-mains,	564,850.00
8. Upper-service engine-house, &c.,	22,957.00
9. " pumping engines,	33,000.00
10. " force-main,	21,835.00
	<hr/>
Carried forward,	\$1,626,795.17

ENGINEER'S REPORT.

81

	Brought forward,	\$1,626,795.17
11.	Upper Reservoir,	133,762.20
	Lands and damages,	169,050.00
	Distribution,	1,912,324.70
	Engineering and office-expenses,	125,000.00
	Total,	<u>\$3,966,932.07</u>

APPROXIMATE ESTIMATE

OF THE COST OF DISTRIBUTION IN THE CITY OF PROVIDENCE.

FROM HOPE-STREET RESERVOIR.

LOW SERVICE.

9,430 feet of 36 inch pipe,	\$22.00	\$207,460.00
7,740 " 30 " "	17.00	131,580.00
16,740 " 24 " "	12.00	200,880.00
11,300 " 20 " "	9.00	101,700.00
55,960 " 12 " "	4.00	223,840.00
103,100 " 8 " "	2.50	257,750.00
187,160 " 6 " "	2.00	374,320.00

Stop-cocks.

10 36 inch stop-cocks,	1,800.00	18,000.00
17 30 " "	850.00	14,450.00
12 24 " "	425.00	5,100.00
10 20 " "	350.00	3,500.00
41 12 " "	80.00	3,280.00
108 8 " "	50.00	5,400.00
540 6 " "	36.00	19,440.00

Hydrants.

600 Hydrants,	60.00	36,000.00
For contingencies and omissions (10 per cent),		160,270.00

 \$1,762,970.00

HIGH SERVICE.

7,500 feet of 12 inch pipe,	\$4.00	\$30,000.00
16,850 " 8 " "	2.50	42,125.00
23,800 " 6 " "	2.00	47,600.00
4,000 " 4 " "	1.75	7,000.00

Stop-cocks.

7 12 inch stop-cocks,	80.00	560.00
22 8 " "	50.00	1,100.00
57 6 " "	36.00	2,052.00
10 4 " "	24.00	240.00

Hydrants.

85 hydrants,	60.00	5,100.00
Contingencies and omissions (10 per cent),		13,577.70

 149,354.70

 1,762,970.00

Total,

 \$1,912,324.70

DISTRIBUTION BY THE PAWTUXET PLAN.

LOW SERVICE.

12,867 feet of 30 inch pipe,	\$17.00	\$218,739.00
33,800 " 24 " "	12.00	405,600.00
6,000 " 20 " "	9.00	54,000.00
47,890 " 12 " "	4.00	191,560.00
117,290 " 8 " "	2.50	293,225.00
177,510 " 6 " "	2.00	355,020.00
2 36 inch stop-cocks,	1,800.00	3,600.00
18 30 " "	850.00	15,300.00
40 24 " "	425.00	17,000.00
4 20 " "	350.00	1,400.00
40 12 " "	80.00	3,200.00
108 8 " "	50.00	5,400.00
540 6 " "	36.00	19,440.00
600 hydrants,	60.00	36,000.00
Contingencies and omissions (10 per cent),		161,948.40
		<hr/>
		\$1,781,432.40

HIGH SERVICE.

Same as from Hope-street Reservoir,	149,354.70
Total,	<hr/>
	\$1,930,787.10

COMPARATIVE COST OF COMPLETE WORKS

BY THE VARIOUS PLANS

(Including Distribution.)

<i>Scott's Pond Plan</i>	.	.	.	.	<i>\$3,686,023.65</i>
<i>Pawtuxet Plan</i>	.	.	.	.	<i>4,477,035.08</i>
<i>Ten-Mile River Plan</i>	.	.	.	.	<i>3,663,104.82</i>
<i>Pawtucket Plan</i>	.	.	.	.	<i>3,966,932.07</i>

ANALYSES OF SOILS AND WATERS.

CHARLES E. CARPENTER, ESQ.,

Chairman of Committee on Water Supply.

DEAR SIR:—I have the honor of submitting to you the following report, embracing the results of analyses made by me, between the months of December, 1866, and May, 1868, and describing

Well-waters from the city of Providence,

River waters,

Soils.

All the samples were from sources unknown to me, the soils and a portion of the waters being furnished by J. H. Shedd, Esq., your Hydraulic Engineer; the other specimens of water having been collected and forwarded to me by yourself.

WELL WATERS FROM CITY OF PROVIDENCE.

In the following table I present the results of analyses of samples of water from the city of Providence; these I have arranged in what I consider to be pretty nearly the order of their comparative fitness for domestic use, the best samples coming first in order. (For the convenience of the reader, Mr. Carpenter has filled out columns 2 and 3 since this report was presented.)

TABLE I.

Mark of Sample.	Locality.	Ward.	No. of Grains per Imp. Gal.			Qualitative Analyses, showing prominent or peculiar impurities.	Hardness to Soap.
			of total im- purities.	of organic & volatile.	of mineral matters.		
3	Rear of 152 Charles Street,	I.	13.9	5.53	8.40	Chloride of Sodium; traces of Sulphate, Nitrate and Carbonate of Lime, Carbonate of Magnesia.	4.90°
9	25 East Street,	III.	20.51	3.88	16.63	Nitrate of Lime, strong.	5.95°
6	Cor. Cooke and Manning Sts.	II.	13.33	4.02	9.31	Sulphate of Lime; Carbonate of Magnesia, trace of Nitrates.	7.70°
22	98 Cranston Street,	VIII.	18.69	4.90	13.79	Sulphate of Lime, strong; Ox. of Iron, Nitrates, medium.	4.66°
2	532 North Main Street,	I.	25.55	7.07	18.48	Nitrate of Lime; Sulphate, trace.	7.30°
4	City Pump, Town House Lot,	II.	24.57	7.56	17.01	See full analysis in Table III.	10.85°
23	184 Carpenter Street,	VIII.	20.65	7.03	13.62	Sulphate of Lime, strong. Unoxidized organic matter.	5.33°
1	388 North Main Street,	I.	27.54	6.93	20.61	Magnesia Salts abundant.	12.60°
24	N. W. c. Penn and Courtland Street.	VIII.	26.11	9.41	16.7	Alumina, Sulphate of Lime, strong. Unoxidized organic matter.	6.00°
21	164 Broadway,	VII.	30.38	8.96	21.42	Nitrates abundant.	7.66°
18	120 Lockwood Street,	VI.	28.42	11.34	17.08	Nitrates abundant.	6.00°

19	Rawson Fountain.	VII.	36.68	9.24	27.44	Chloride of Calcium.	10.33°
5	59 George.	II.	32.27	6.68	25.59	See full analysis in Table III.	11.55°
8	90 Transit.	III.	39.13	8.92	30.21	See full analysis in Table III.	13.30°
10	284 Westminster.	IV.	34.09	9.76	24.33	Sulphate, Nitrate, and Carbonate of Lime, and Carbonate of Magnesia.	13.44°
13	Field Fountain.	V.	38.92	10.08	28.84	Sulphate of Lime, strong. Unoxidized organic matter.	9.45°
7	246 South Main.	III.	39.65	10.39	29.26	See full analysis in Table III.	15.75°
20	Cor. Fountain and Oliver.	VII.	55.51	11.55	43.96	Chlorides of Sodium and of Calcium. Sulphate of Lime, strong. Nitrates.	10.33°
17	47 Stewart.	VI.	69.16	12.39	56.77	This sample contained a little free acid, apparently Nitric.	16 00°
15	Cor. Hospital and Borden.	V.	61.18	19.32	41.86	Sulphate and Carbonate of Lime, strong. Carbonate of Magnesia, strong. Unoxidized organic matter.	13.30°
11	63 Sabin.	IV.	72.55	22.19	50.36	Nitrate of Lime, strong.	21.42°
14	46 Point.	V.	42.98	13.09	29.89	Sulphate of Lime, strong. Ammonia! Carbonate of Soda. Chloride of Sodium.	12.25°
16	293 Broad.	V.	82.39	14.98	67.41	Ammonia! Nitrates strong. Sulphate of Lime, strong.	13.70°
12	61 Aborn.	IV.	97.33	28.94	68.39	Ammonia! Nitrates strong. Lime salts abundant.	22.26°

NOTE. — Throughout this report, the water analyses are calculated for the Imperial gallon, containing 70,000 grains.

For the easier comprehension of the manner in which the above table describes these twenty-four samples of water, I will refer in detail to two cases.

The sample which was sent to me marked "3," was from the rear of 152 Charles Street, Ward I., and contained (in the Imperial gallon of 70,000 grains) 13.93 grains of total impurities. These impurities consisted of 5.53 grains of organic and volatile matters (embracing animal and vegetable matters), and 8.40 grains of mineral matters, making a total of 13.93 grains. The most prominent of the mineral matters was *Chloride of Sodium* (common table salt); in addition to which, there were detected small amounts of *Sulphate*, *Nitrate*, and *Carbonate of Lime*, and *Carbonate of Magnesia*. The hardness was 4.90 degrees, an amount not excessive for well-water. I call this a pretty good sample, and, considering all things, the best of the collection; I therefore place it at the head of the list.

On the other hand, the sample sent to me marked "12," was from 61 Aborn Street, Ward IV. It contained the unusually large amount of 97.33 grains of total matters to the Imperial gallon; made up of 28.94 grains of organic and volatile matters, and 68.39 grains of mineral salts. Among these impurities I was astonished to find *Ammonia*, an abundance of *Nitrates*, and a large amount of *Lime*. The water was of the uncommon hardness expressed by 22.26°. It is very plain that this is the worst sample; it is therefore placed at the close of the list.

The other samples are ranged along intermediate, as they shade in quality, from sample "3" down to the very bad sample "12."

GENERAL INFERENCES.

From the results stated in the above table, I am of the opinion that the majority of the samples contain impurities of such a *character* and in such *amount* as to render them unsuitable *either for general domestic purposes, or for most manufacturing purposes*.

It must be admitted that owing to difficulties attending exper-

iments upon the subject, it is impossible to state with exactness, what *amount* of impurities is allowable in water for drinking purposes. One authority states that water containing below 15 grains per gallon may be safely employed, provided it does not contain much organic matter. At the Sanitary Congress, at Brussels, in 1853, "it was decided that the total amount of solids ought not to exceed 35 grains per gallon. The same rule had been previously laid down in the *Annuaire des Eaux de la France* for 1851." I am inclined to the opinion however, that the average amount of solids, in *well-water* which experience has indicated to be good for domestic use, is about 25 grains per gallon. The waters of rivers and ponds almost invariably contain far less amounts. The following table is quoted to show the character of the water supplied (or proposed to be supplied) to some of the cities of the United States.

TABLE II.

Locality.	Analyst.	No. of Grains per Imp. Gallon			Hardness to Soap.
		Of Total Im- purities.	Of Or- ganic and Volatile.	Of Mineral Matters.	
Connecticut River, <i>Hartford.</i>	B. Silliman, Jun. June, 1861.	3.07	1.26	1.81	1.64°
Acushnet River, <i>New Bedford.</i> (4 sampl's)	Professor Chace, Aug. 1863.	3.83	2.19	1.64	.84°
Cochituate, <i>Boston.</i>	B. Silliman, Jun. 1845.	4.04	1.39	2.65	—
Fairmount, <i>Philadelphia.</i>	" "	6.59	1.40	5.19	—
Croton River, <i>New York.</i>	" "	12.71	4.73	7.98	—

Now by an examination of table I., it will be observed that in the samples analyzed, from the city of Providence, the solids not only were in much greater amount than in any of the samples of table II., but that a large proportion of them exceeded even

the largest of the estimates for potable waters (viz.: the *Brussels*, 35 gr. to the gallon).

Moreover, the *qualitative* analyses show that the Providence well-waters contain considerable quantities of *Nitrates*, of *Magnesia Salts*, and of *Sulphate of Lime*, and that three of the samples contain *Ammonia*,—matters which are believed to be prejudicial to health.* Four of the Providence samples (selected at random), Nos. 4, 5, 7, and 8, having been subjected to a more extended analysis, are described by the following table. The numbers express how many grains of the several substances there are in a gallon of water.

TABLE III.

	No. 4.	No. 5.†	No 7.	No. 8.
Silicic Acid (sand, &c.).....	Trace.	.17	.22	} .14
Alumina and Oxide of Iron.....	.30	.03	.45	
Lime.....	4.27	5.00	6.91	7.63
Magnesia.....	1.76	1.40	2.09	1.94
Potassa and Soda.....	2.13	4.62	5.21	6.30
Sulphuric Acid.....	3.41	3.96	4.17	4.85
Chlorine.....	4.97	3.32	5.73	5.84
Nitric Acid.....	Not determined.	—	—	—
Carbonic Acid.....	Not determined.	—	—	—

* Although it is the business rather of the physician than of the chemist to show how the animal system is affected by the matters mentioned as detected in these drinking waters, yet I will venture to make a few statements upon the subject.

Animal matters by their decomposition produce *Nitrates* and *Ammonia* salts: when therefore these latter compounds are detected, they indicate that the water in which they are found may have been contaminated by animal matters.

Magnesia salts in the water are believed to be the cause of the disease known as the goitre, prevalent in some parts of Switzerland. "The amount of lime and magnesia salts required to produce goitre is not precisely known. In the gaol at Durham, Johnston states that when the water contained 77 grains per gallon (chiefly of lime and magnesia salts,) all the prisoners had swellings of the neck; these disappeared when a purer water containing 18 grains to the gallon was obtained." Parkes' Hygiene, London, 1866.

It is believed that the *Carbonate of Lime* may exist in water in considerable quantity without injury, but that *Sulphate of Lime* is prejudicial in much smaller amount. Although it is well known that *Stone* and *Gravel* are more common diseases in Kentucky (where the water is charged with *lime salts*,) than in any other State in the Union,

† Analysis of No. 5 by my assistant, Mr. Stillwell.

HARDNESS TO SOAP.

I have not yet referred to the last column of table I., which shows the extreme hardness of most of these waters to soap. It is hardly necessary for me to call attention to the waste which is incurred when water of this kind is used for laundry purposes. This hardness and consequent waste is due to the magnesian and calcareous salts in the water; these salts form *insoluble* compounds with the fatty matters of the soap, thus causing a direct expenditure of the latter without corresponding increase of detergent power.

For many culinary purposes also, soft water is desirable. It is well known that in making soups and broths, for example, the juices of the meat are much more quickly and completely dissolved out by soft water than by hard water. M. Soyer, the eminent *chef de cuisine* stated, in reply to the questions of the Commissioners of the London Board of Health (1850), that for some kinds of cooking, when hard water was used, decidedly more time was required and more fuel was consumed than was the case when soft water was used. He also expressed it as his opinion, the result of careful experiments, that in the making of tea with Thames water (hardness, perhaps 16°) a waste was incurred amounting to nearly *one third* of the tea used.

yet I believe that their occurrence must be referred to causes (as yet unknown) *other* than the mere hardness of the waters.

"The comparative value of the new soft supply over the old hard supply, has been matter of discussion at the Glasgow Southern Med. Soc., of which I was president two years. It was the unanimous opinion of the medical profession that great benefits of a sanitary kind had followed in the substitution of the soft water on the principle of constant supply. It has been observed that since this change, urinary diseases have become less frequent, especially those attended by the deposition of gravel." Dr. Leach, in Board of Health Reports, London, 1851.

"Thus much seems to be certain, that as precise investigations proceed, and, indeed, in proportion to the care of the inquiry and the accuracy of the chemical examination, a continually increasing class of cases [of disease] is found to be connected with the use of impure water, and it seems only reasonable to infer that a still more rigid inquiry will further prove the frequency and importance of this mode of origin of some diseases." Parkes' Hygiene. 1866.

For most manufacturing purposes * it is important to have a supply of pure soft water. The scale which forms on steam boilers by the use of hard waters, consists, in the majority of cases, of a mixture of *Sulphate of Lime* with *Carbonates of Lime and of Magnesia*. The analyses of Table I. show that most of the waters contain large amounts of these incrusting ingredients, and the experience of our city manufacturers has taught them the extreme difficulty, I may say the impossibility, of finding waters free from injurious quantities of these matters. In a city like this, no more than an allusion is necessary, to the vexations, the waste of fuel, and the danger to life and property incident to explosion, which are incurred by the use of hard waters.

For the purposes of bleaching, calico-printing, and the other delicate manufactures of which this city has reason to be proud, an abundant supply of pure water is invaluable.

RIVER WATERS.

The table which follows, Table IV. shows the results of my analyses of certain other waters received from you.

A comparison of the results of this table with those of Table I. presents the most striking differences. The samples described in Table IV. are of remarkable softness and purity. The *organic* matters present seem to be entirely vegetable, since in no case could nitric acid (the indicator of animal matters) be detected. The *mineral matters* also, it will be seen, are harmless in *quantity* and *quality*. In the case of the sample of May 13, 1868 (Pawtuxet River), tests were made with especial care, for the purpose of discovering metallic impurities, in case any such should be suspended or dissolved in the water. None could be detected, except indeed, slight traces of *Alumina* and *Oxide of*

* I find that brewers like for their purposes a water containing an abundance of lime-salts, a very hard water therefore; in fact such water is used by the great English brewers, Messrs. Allsopp & Bass. Some brewers, however, seem to prefer soft water.

Iron,—uninjurious substances which are found in small quantities in all natural waters. No traces either of *Nitrates* or of *Ammonia* could be found.

The analyses indicate, therefore, that these waters are excellent for drinking, for cooking, for washing, or for general manufacturing purposes.

TABLE IV.

Sample.	Locality.	No. of Grains per Imp. Gallon.			Qualitative Analysis.	Hardness to Soap.
		Of Total Im- purities.	Of Or- ganic and Volatile.	Of Mineral Matters.		
Dec. 1866.						
1.	A Pawtuxet River, Station 6.	2.69	1.15	1.54	{ A little Chloride of Sodium. { Trace of Lime. Trace of Iron. }	0.72°
2.	B Woonasquatucket River.	2.69	1.19	1.50	Same as above.	0.72°
3.	C Ten-Mile River.	3.29	1.54	1.75	" "	0.88°
May 24, 1867.						
1.	D Pawtuxet River, Station 36.	2.55	1.36	1.19		
{ Same after stand- ing 24 hours. }	D " "	2.34	1.33	1.01		
	E Pawtuxet River, Station 7.	2.31	1.19	1.12		
Oct. 4, 1867.	F Pawtuxet-River, Station 9.	3.25	1.29	1.96	{ A little Chloride of Sodium. { Trace of Carbonate of Lime. { Trace of Iron. }	0.35°
Nov. 27, 1867.						
	G Blackstone, Ashton Dam.	3.04	1.33	1.71	{ Chloride of Sodium. { Traces of Lime, Magnesia, and Iron.	0.70°
	H Canal at Lonsdale.	2.90	1.40	1.50		0.70°
	I Scott's Pond, South End.	2.73	1.22	1.51		0.70°
May 13, 1868.	J Pawtuxet River, Station 6.	2.27	1.12	1.15		0.66°

THE ACTION OF WATER ON LEAD.

In a previous report upon samples, A, B, and C of Dec., 1866, I expressed the opinion that such pure waters might act on lead pipes, it being well known to chemists that pure water acts upon lead more strongly than hard water does. Subsequent experiments proved that such was indeed the case: that these samples (A, B, and C), by contact with metallic lead, formed a powdery compound of *Hydrate and Carbonate of Lead*. This compound I found could be separated by filtration; and upon testing the filtered water I did not detect any lead.

In view of these facts, I was requested to make some experiments upon *tin-lined* pipes. I received from Mr. Shedd several pieces of this pipe, which had been soldered so as to form *tees*, the soldering being done (I am informed) without any extra precautions, by a man who did not know that they were to be tested. I subjected them to tests for the purpose of learning, whether, in soldering, the tin had *run* so as to expose the lead to water which might be used in the pipe. As the result of my experiments I formed a favorable opinion of this pipe; for I found that although in one case after standing two days the water took a very slight trace of lead from the joint, yet, in another case, hot water standing in the pipe six days gave no test for lead. It appears, therefore, that with care these pipes may be so joined as to expose no lead to the water.

ANALYSES OF SOILS.

The following table (Table V.) shows the composition of four samples of soil received from Mr. Shedd. The samples were of different degrees of moisture; but for the purpose of easier comparison, I annex to each analysis, under the head of "Reduced per cents," the composition of the soils, *supposing the amount of moisture to be reduced in each case to a standard of 25 per cent.*

TABLE V.

	1.		2.		3.		4.	
	Actual Per Centa.	Reduced Per Centa.	Actual Per Centa.	Reduced Per Centa.	Actual Per Centa.	Reduced Per Centa.	Actual Per Centa.	Reduced Per Centa.
Moisture,	42.28	25.00	40.23	25.00	25.78	25.00	74.09	25.00
Insoluble Matter, Sand, &c.,	54.36	70.65	57.25	71.84	72.47	73.23	49.39	70.02
Insoluble Matter, vola- tile,	[2.99]	3.88	[2.20]	2.76	[1.32]	1.34	[2.69]	3.81
Soluble Matter, fixed,	.25	.32	.28	.35	.38	.38	.66	.93
“ “ volatile,	.12	.15	.04	.05	.05	.05	.17	.24

[The results in brackets were determined by difference.]

These analyses indicate that water passing over such soils would take up only an extremely small quantity of soluble matters.

Respectfully submitted,

JOHN H. APPLETON.

BROWN UNIVERSITY LABORATORY,
Providence, May 20, 1868.

STATISTICS IN REGARD TO THE WATER SUPPLY OF PROVIDENCE, FURNISHED BY THE CITY OFFICERS.

OFFICERS.....	DISTRICTS.														Total.
Charles A. Horton.	Andrew Kendall.	Anthony B. Horton.	James M. Wright.	John R. Oakes.	Theodore Ruthenford.	Isaac Brown.	Alvin E. Hall.	James Milner.	Abel C. T. Wheeler.	George Norcross.	Francis Gould.	Hiram Hart.	Edwin R. Jones.		
Whole number of wells.....	70	70	4	317	21	440	508	412	685	227	137	225	..	35	3,143
Number that are considered good.....	38	50	2	191	15	434	390	397	565	163	127	186	..	28	2,544
Number considered bad or indifferent.....	14	20	2	126	6	9	118	75	120	74	10	39	..	7	599
Wells in which the water is soft.....	29	29	1	6	6	9	114	21	85	12	23	52	..	9	806
Wells, water hard, not used for washing.....	23	70	3	311	19	431	394	391	600	225	112	173	..	36	2,787
Wells that fail.....	13	4	1	47	1	15	35	49	82	41	3	83	..	15	374
Wells used by one family.....	12	22	1	45	7	113	65	205	116	60	17	40	..	15	779
Wells used by two families.....	8	16	1	100	4	113	154	17	80	24	48	10	..	10	838
Wells used by three families.....	10	11	1	38	4	69	46	17	80	26	29	15	..	3	338
Wells used by four families.....	6	7	1	49	4	64	73	18	96	20	18	28	..	4	371
Wells used by five families.....	5	6	1	18	4	30	6	40	14	13	18	10	..	1	142
Wells used by six families.....	4	2	1	23	4	25	63	2	40	14	13	18	..	1	205
Wells used by seven families.....	4	2	1	23	4	25	63	2	40	14	13	18	..	1	205
Wells used by eight families.....	6	10	1	21	2	60	74	7	100	3	30	54	..	2	370
Wells used by nine families.....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Wells used by ten families.....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Wells used by eleven families.....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Wells used by twelve families.....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Wells used by thirteen families.....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Wells used by fourteen families.....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Wells used by fifteen families.....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Wells used by sixteen families.....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Wells used by seventeen families.....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Wells used by eighteen families.....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Wells used by twenty families.....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Wells used by twenty-five families.....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Wells used by thirty families.....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Wells used by thirty-five families.....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Wells used by forty families.....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Wells used by fifty families.....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Wells used by one hundred families.....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Wells not used for any purpose.....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Families supplied by fountains.....	6	1	75	4	40	24	171	4	3	53	..	..	..	36	550
Families supplied by artesian wells.....	4	1	134	4	2	3	178	3	16	8	1	9	..	4	367
Families supplied by artesian wells.....	4	1	134	4	2	3	178	3	16	8	1	9	..	4	367
Number of markets.....	3	6	3	28	2	17	8	6	21	5	10	4	..	3	117
Number of stores.....	80	125	23	73	97	60	33	20	93	70	30	75	..	241	1,098
Number of shops.....	54	47	80	40	84	90	82	8	18	23	15	46	..	111	695
Number of offices.....	229	35	20	15	138	3	15	..	6	3	5	27	..	140	642
Number of hotels.....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Number of restaurants.....	4	6	1	6	0	2	..	..	..	..	..	..	..	..	..
Number of saloons.....	11	27	..	22	27	..	9	..	..	..	..	..	..	..	..
Number of stables.....	3	9	13	53	15	102	47	89	116	43	63	91	..	3	14
Number of horses kept in them.....	7	47	100	292	80	339	221	397	341	229	99	195	..	111	657
Number of carriages and vehicles.....	12	32	153	227	78	373	221	487	400	244	134	253	..	103	2,504
Number of greenhouses.....	4	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Number of bathing-tubs.....	6	20	..	33	14	74	46	402	82	100	29	37	..	38	893
Number of water-closets.....	10	11	43	14	13	64	31	10	..	..	..	..	..	9	285
Cisterns, water used for all purposes.....	..	..	..	35	12	12	22	..	49	..	15	..	..	17	156

STATISTICS BY CITY OFFICERS.

(Continued.)

Number of Wooden Buildings	7,081
Number of Brick and Stone Buildings	400
Number of Dwellings	6,981
Number of Churches	53
Number of City Buildings	19
Number of School Houses	27
Number of Printing Offices	8
Number of Railroads	5
Number of Gas Companies	1
Number of Steamboats	26
Quantity of fresh water used daily by the same,	
in gallons	110,000
Number of Distilleries and Breweries	3
Number of Bakeries	11
Number of Public Buildings and Charitable Institutions	67
Number of Photographers	14
Number vessels arrived in Prov. 1866	3,000
Gallons water purchased by the same	94,225
Number of Steam Engines	132
Amount of Horse power	6,874
Number of Steam Boilers	341
Gallons water used to operate them annually	133,434,600
Tons coal used annually by same	56,034
Manufactories using Steam Power	119
Manufactories not using Steam Power	548
Estimated amount for Fire Hydrants	} gallons 10,000,000
Estimated amount for Fire Engines	
Estimated amount for building purposes	" 40,000,000

Of the Artesian wells reported, 185 families consider the water of a very inferior quality.

Officers Jones, Hart, and Oakes, report a general complaint in

their districts, of the poor quality and insufficient supply of Fountain water in the summer months.

The high price of water prevents shipping being supplied at this port. The larger portion procure water on the North River and Delaware Bay near Philadelphia; they have trouble in getting it out of the river, would gladly get their supply here but for the price, about one cent per gallon.

The steamers and tugboats running in the bay, would supply entirely with fresh water but for the price; they now use a large proportion of salt water, to the detriment of boilers and machinery.

Rates of insurance vary from $\frac{1}{2}$ to $1\frac{1}{2}$ per cent, dependent on the uses to which buildings are put: in localities unfavorable to a ready supply of water in case of fire, rates are up to $2\frac{1}{2}$ per cent.

Respectfully submitted,

WILLIAM H. AYER,
Clerk of Police.

Monthly and Annual Quantity of Rain and Snow (reduced to water) in inches, as observed and recorded by Prof. ALEXIS CASWELL, at College Hill, Providence, R.I.

YEARS.	JAN.	FEB.	MAR.	APR.	MAY.	JUNE.	JULY.	AUG.	SEPT.	OCT.	NOV.	DEC.	TOTAL.
1832	3.87	4.25	3.20	3.33	4.14	0.33	1.82	3.92	3.50	2.01	3.46	5.63	39.46
1833	1.71	1.55	1.97	3.17	0.99	4.11	1.11	2.15	1.53	5.98	4.50	4.67	33.44
1834	1.57	1.13	1.43	3.13	5.61	5.10	7.58	1.15	3.81	4.64	3.90	2.97	41.92
1835	3.50	1.20	4.60	4.06	1.50	1.95	2.84	2.25	0.83	3.26	1.72	3.25	30.96
1836	5.63	3.45	5.00	2.30	2.51	3.25	1.53	0.72	1.03	2.35	5.25	4.85	37.87
1837	1.40	2.65	3.17	4.65	7.28	2.82	1.38	2.00	0.48	1.29	1.95	2.55	31.62
1838	2.70	2.32	2.70	2.70	3.88	3.30	0.63	3.55	6.76	4.61	3.65	1.08	37.68
1839	0.76	1.80	1.50	3.63	3.79	2.31	5.26	5.00	1.83	3.75	2.30	5.12	36.75
1840	2.80	2.65	3.50	3.45	3.35	2.89	3.38	3.20	2.95	5.17	5.35	3.10	41.19
1841	6.45	1.50	2.86	7.78	2.18	0.98	5.13	5.12	2.35	3.20	4.45	5.86	47.86
1842	1.30	4.05	2.07	2.10	3.40	9.65	1.48	3.35	1.40	1.16	3.82	3.93	37.71
1843	0.60	5.27	5.58	4.34	3.50	2.12	1.83	6.23	2.20	6.45	1.35	3.03	42.50
1844	4.32	1.95	4.75	0.67	1.95	1.15	4.42	1.11	2.83	5.80	3.30	2.75	35.00
1845	3.20	2.70	3.53	2.34	2.75	2.32	3.10	5.03	1.63	3.40	9.08	3.48	43.16
1846	1.82	2.08	2.86	1.75	4.58	1.30	1.44	2.73	2.33	1.85	4.62	3.15	30.51
1847	2.13	2.71	3.17	1.72	2.02	6.98	2.28	5.60	8.35	1.05	5.72	5.97	48.60
1848	4.82	3.80	2.40	0.95	5.00	3.80	1.85	3.73	2.45	4.05	3.80	3.53	40.48
1849	0.80	0.60	5.99	1.62	3.43	1.23	2.00	3.39	3.14	6.55	2.42	3.62	34.79
1850	5.60	3.38	5.19	4.67	5.00	2.60	2.35	7.65	5.00	2.10	2.10	5.85	51.49
1851	1.93	3.87	2.00	7.80	3.58	1.90	5.19	3.77	2.47	3.20	5.05	2.62	43.38
1852	2.70	2.00	3.55	6.65	2.00	1.00	1.68	8.00	1.40	1.30	4.60	3.70	38.58
1853	4.27	5.75	1.35	5.05	4.95	0.90	6.37	8.38	3.80	4.15	4.40	3.90	53.27
1854	1.80	4.85	2.85	6.30	3.60	3.00	2.45	0.30	6.10	1.90	9.15	3.35	46.25
1855	6.45	4.05	0.85	2.50	2.55	1.95	3.25	2.02	0.25	5.33	3.75	6.10	39.05
1856	5.25	0.80	1.55	2.80	4.10	2.47	4.20	5.75	5.10	1.15	2.00	5.80	40.97
1857	5.50	2.30	3.35	6.29	4.33	1.90	3.45	4.50	2.27	2.00	2.40	5.20	44.75
1858	3.33	2.80	2.05	3.63	2.35	5.55	4.90	8.20	3.05	2.80	2.40	3.45	44.51
1859	5.75	1.85	8.00	2.28	3.40	7.06	1.14	3.60	3.65	2.62	2.27	3.45	45.16
1860	1.00	3.54	1.80	1.55	1.65	4.02	3.09	5.70	5.38	2.10	3.95	4.66	38.44
1861	4.87	2.95	4.62	7.75	3.22	4.61	2.21	4.50	2.75	2.17	3.20	1.40	44.25
1862	6.06	3.15	4.12	1.60	2.60	6.75	3.52	1.27	7.35	4.77	6.85	2.10	50.14
1863	4.61	4.04	4.88	5.52	2.33	1.90	9.42	4.59	1.74	2.97	7.51	5.66	55.17
1864	4.66	1.53	4.74	2.46	3.15	1.22	1.46	4.05	2.36	2.85	3.42	4.93	36.53
1865	5.29	5.45	5.50	2.98	6.23	1.55	3.91	0.74	0.27	4.60	4.03	4.08	44.60
1866	2.35	5.64	4.27	2.02	5.29	4.42	2.03	3.64	5.75	2.78	3.97	3.96	46.02
1867	5.72	6.80	5.32	2.24	3.94	1.56	3.15	8.23	0.62	4.07	2.59	2.80	47.04
Means.	3.51	3.04	3.51	3.55	3.50	3.07	3.13	4.05	3.03	3.37	4.01	3.94	41.71

Providence, R.I. - Office of the
water commissioner.

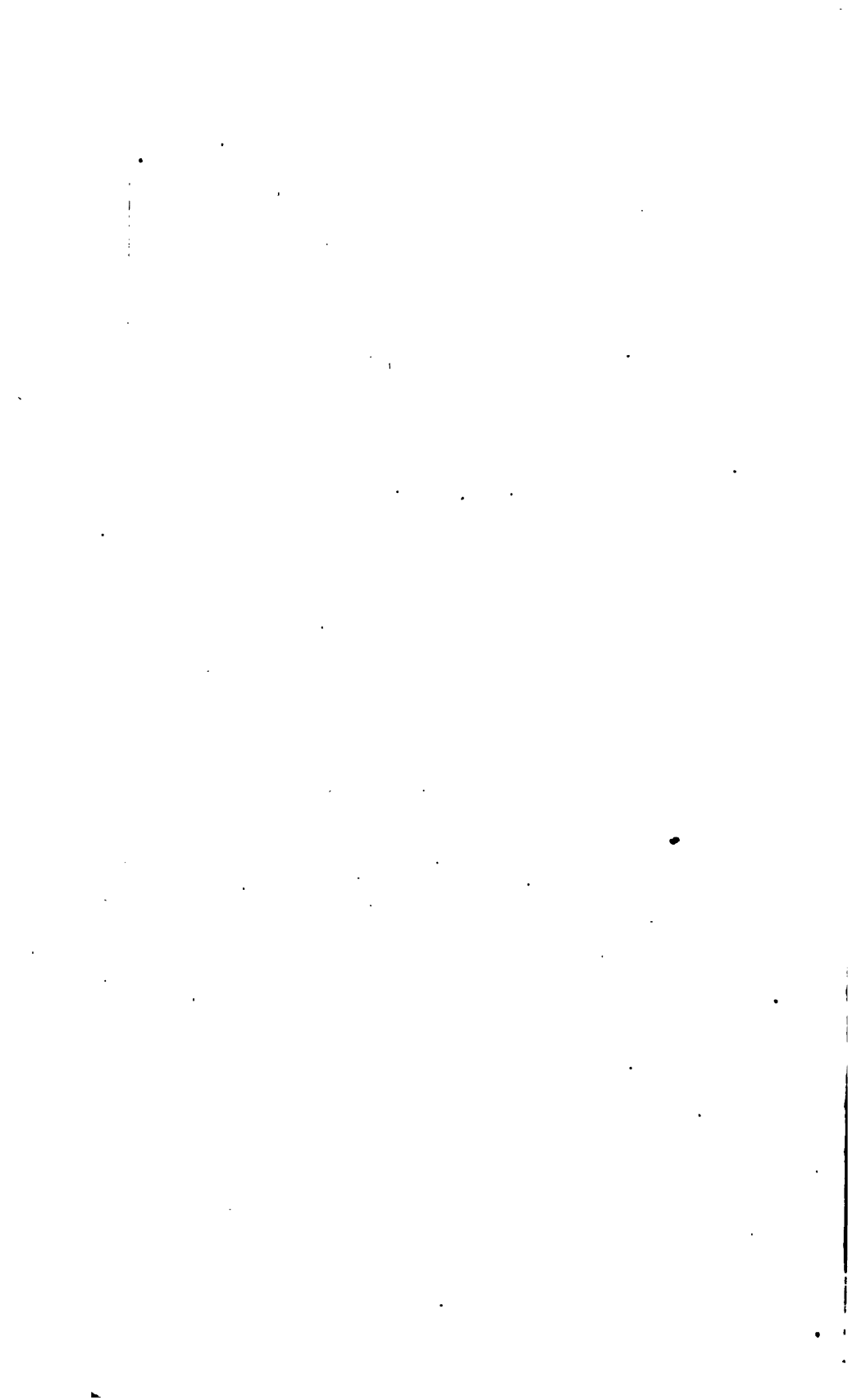
PROVIDENCE WATER WORKS.

REPORT
OF THE
CHIEF ENGINEER.

JANUARY, 1871.



PROVIDENCE:
HAMMOND, ANGELL & CO., PRINTERS TO THE CITY.
1871.



With the respects of

J. HERBERT SHEDD.

C

PROVIDENCE WATER WORKS.



REPORT

OF THE

CHIEF ENGINEER.

JANUARY, 1871.

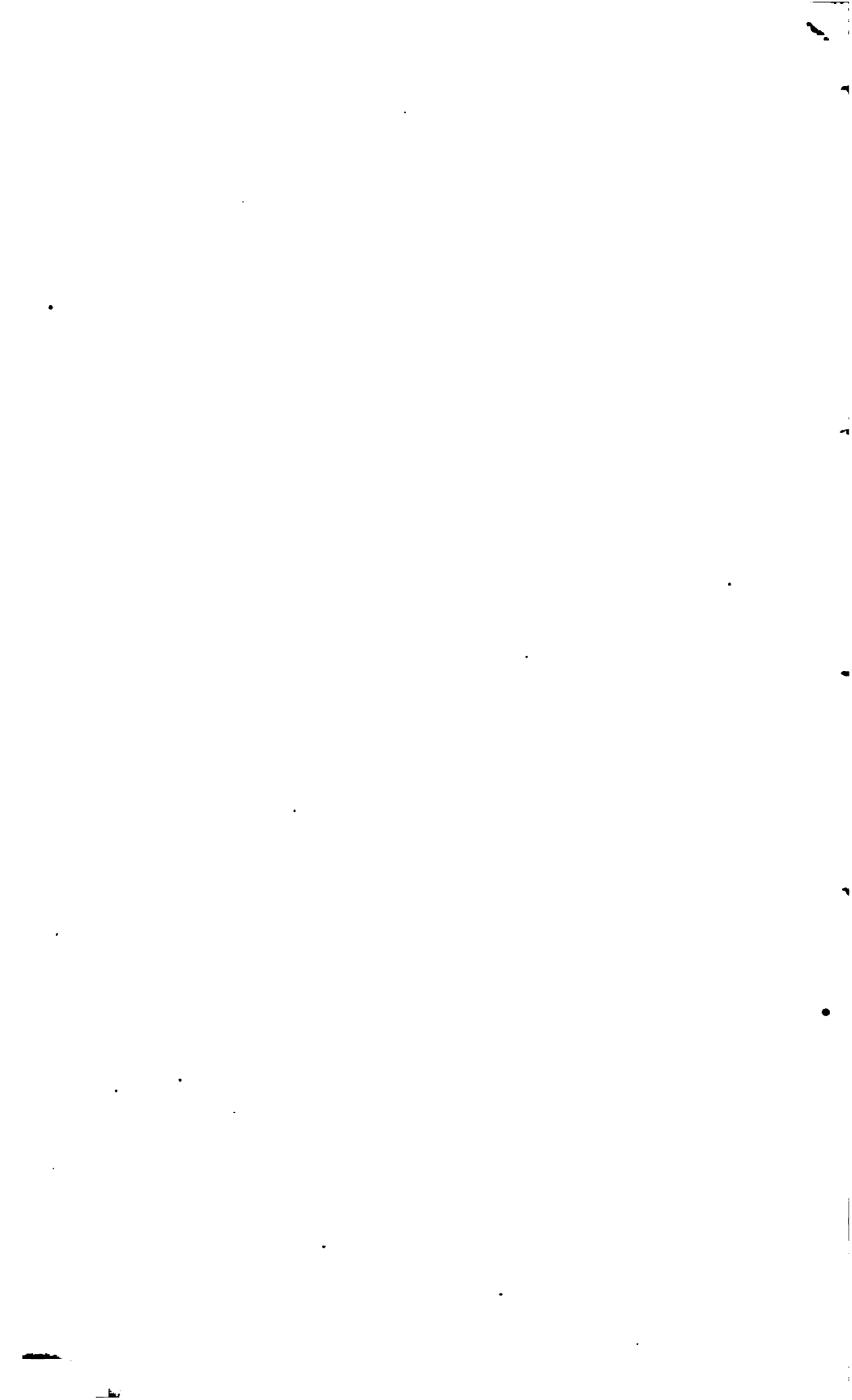


PROVIDENCE:

HAMMOND, ANGELL & CO., PRINTERS TO THE CITY.

1871.

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PROVIDENCE WATER WORKS.

OFFICE OF THE CHIEF ENGINEER, }
PROVIDENCE, January 2, 1871. }

To Messrs. M. B. LOCKWOOD,

CHARLES E. CARPENTER,

JOSEPH J. COOKE,

Water Commissioners of the City of Providence.

GENTLEMEN:—I respectfully submit the first formal report upon the work done under my direction during the last fifteen months.

Having assumed the duties to which you appointed me, in October, 1869, I first gave attention to those parts of the work likely to require the longest time for their execution, and caused surveys to be made on Sockanosset Hill, with reference to the definite location and plan of construction of the principal reservoir; and on the grounds selected for a pumping station, with reference to their best treatment for that purpose.

In considering the construction of a reservoir, two questions of considerable importance were to be settled. The principal one, as to the necessity for making filter-beds in connection

with the reservoir, had received considerable attention from yourselves, and the course of your deliberations tended to a very careful inquiry into all the plans that could be adopted for filtering the water, and to such an arrangement of the work, if possible, as would allow the decision of the question of the construction of expensive artificial filter-beds to be delayed until after the first introduction of water into the city.

During your earnest consideration of the matter, the plan occurred to me of using as a natural filter, the sand, over and through which the river flows, making it available by excavating basins near the river, and below the level of its surface. This plan was favorably received by you, and as our preliminary examinations were satisfactory, the scheme was accepted as a happy settlement of the question; whereupon all discussion of the subject ceased.

The second question, as to whether the reservoir should be constructed in two parts on Sockanosset Hill, or have one part transferred to a suitable location in the city, was somewhat involved with the first; for, in the scheme proposed by the Committee of the City Council, and taken as a general guide for our plans, the line of filter-beds occupied the place of a division embankment between the two portions of the reservoir.

The subject of filtration was discussed in the report to the Committee of the City Council, above referred to; and though the full estimates for each plan of supply included the cost of filter-beds, their construction, while inferentially, was not specially recommended, but was left for future decision, as may be seen by this quotation:—"In regard to any of the waters recommended for the supply of the City of Providence, the amount of soluble matter in them is so very small, so much less than in the best of wells, that it would seem to be superfluous to filter them for the sake of reducing this amount. And, so far as practical utility is concerned, the same may be said of separating the small amount of suspended matter left after passing the settling basin. But, in

case extraordinary purity should be desired, the plans submitted embrace provision for filtration, which may be adopted or not at pleasure." Whether there are some subtle and injurious elements, undiscoverable, or at least undiscovered by ordinary chemical tests, and common to all waters, available for public supply, which would be affected by thorough filtration, is not discussed; and, indeed, our present knowledge of the matter is hardly sufficient to allow of its intelligent discussion.

The matter which it seems desirable to have removed from the Pawtuxet water has, for the most part, very little weight or substance, but is simply a coloring matter, coming, I have no doubt, from autumn leaves, and of similar nature, probably, to the coloring matter of that common beverage, tea, and having no injurious quality, so far as known, though it is objectionable to the eye.

This appears only during certain portions of the year, and is of such delicate fineness as to make it doubtful whether filtering, through the ordinary artificial filter-beds, would remove it. To test this, a small filter was constructed, as nearly as practicable, of similar materials and with the same arrangement as would be used in large filters, and having a surface area of one square yard, through which the water of the Pawtuxet river, at the Pontiac Mills, was allowed to flow at about the same rate as would be adopted in practice, or about eight inches per hour. It was also run at a slower rate than this a portion of the time. The water flowing from this filter was at intervals compared with that in the river, and it was found that while the amount of coloring matter was considerably reduced, it was not at any time entirely removed.

A comparison of this water was also conveniently made with the water of a large well excavated in the sand, near the bank of the Pawtuxet river, at Pontiac, and largely supplied, I suppose, by the river water filtered through the sand. It was found that the artificially filtered water had, in comparison, considerable color, though I was much struck by the

remarkable clearness of the well water, both as seen in the beaker glass and in a large body. Professor Appleton has since told me that he has found this water to be almost precisely like the Pawtuxet, differing only as water slowly filtering through a large body of sand would be expected to differ; that is, having a little less vegetable and a little more mineral matter, with slightly increased hardness. If, as seems very probable, this well water is in great measure the naturally filtered Pawtuxet water, it furnishes strong evidence that the coloring matter can be removed by natural filtration through sand, on a still larger scale.

While the artificial filter tests were going on, examinations were being made in the sand basin through which the river flows, near the proposed site for the pumping station, by digging test-pits; by drawing the sand up through small tubes reaching a depth of ten or twelve feet; and by sinking artesian wells to the depth of sixty feet, more or less, by the use of eight-inch iron pipes, which were afterwards withdrawn. Eighteen of the latter, and a great number of the other tests were made; and the character of the material to be removed from the water, the probable inclination of the water-table, the probable effect of the motion of the water upon the stability of the sand, and of the distance of sand passed through upon the color of the water, were carefully considered.

The result of all these investigations led me to the conclusion that the material was well suited for use as a natural filter, and that the probability of obtaining a sufficient quantity of clear water from basins excavated in the sand, at a depth below the surface of the river, at a comparatively small expense, and without permanent clogging, was so great as to leave little or no doubt of our duty to use it rather than to incur the great expense and constant care attendant upon artificial filter-beds, which did not promise to be so effectual for our purpose; and this, notwithstanding the possible chance of failure in the scheme, and the possible need of constructing the artificial filter-beds at last. Even, however, should

it fail as a natural filter basin, it would probably be worth a considerable portion of its cost as a settling basin, from which the water, in this case introduced into it by pipes running through the river embankment, would be pumped.

This project having, as before stated, received your approval, the plans of the Sockanosset reservoir were designed for its construction without filter-beds, but were so arranged as to admit of their construction at some future time, if found necessary, without much interference with the operation of the works, nor much extra expense on account of their being subsequently built. Their proposed location is on the northerly side of the reservoir, where the land is well adapted for them; and openings have been left in both the inlet and outlet chambers for the connection of conduits leading to and from the proposed site.

In regard to the construction of a reservoir within the city, it was necessary to secure a suitable site for it, at such an elevation as would admit of its use in connection with Sockanosset reservoir. Such a site was found at the corner of Hope and Olney streets, and within the square formed with those streets by Barnes and Prospect streets.

One of the chief advantages to be gained by such a reservoir is its action as a regulator in connection with the daily use of water in the city.

Another advantage to be gained by it, is the storage of a considerable quantity of water, near the place of consumption, which could be relied upon for use during a possible stoppage of supply by accident to the leading mains or from other cause.

The use of such a reservoir, as a regulator, will render a thirty-inch main of about equal value for the supply of the city as a thirty-six inch main without such regulator. The reason for this lies in the fact, that the consumption of water in the city, during certain hours of the day, is often about fifty per cent. greater than the *average* hourly consumption, and sometimes much more than that. At times, also, for a

whole day the demand is about fifty per cent greater than the *average*; and occasionally for an entire month, it is one-third greater than the average for the year, with exceptions of even greater monthly consumption. Therefore, a leading main from a reservoir, at a distance of several miles on one side is required to be of greater capacity, in order to supply the greatest demand without too much loss of head, under that rate of flow; but, with another reservoir lying beyond the centre of distribution, near at hand, on the opposite side, a leading main may be of such size as to supply the *average* demand; for, when the draft upon the main exceeds the average quantity, so as to lessen the head upon the pipes, a supply begins to flow from the regulating, or storage reservoir, and thus the demand is supplied from both directions, through pipes of a combined capacity, sufficient to maintain the required head. Again, when the draft becomes less than the average quantity, the head upon the pipes increases, and the water overflows into the regulating reservoir and is stored there for use during the greater demand.

The saving of expense by such a reduction in the size of leading mains was estimated to be nearly sufficient, together with the amount saved by the construction of a single, instead of a double reservoir on Sockanosset hill, to construct the additional reservoir, and to pay for the land on which to build it, leaving the other important advantages of this plan to be gained at a very moderate cost. This view of the matter determined you to adopt the plan for two reservoirs, leaving a single, simple reservoir to be built on Sockanosset hill.

Having determined the general character of the reservoir to be constructed at that place, and having obtained the necessary levels and contour lines, and learned something of the character of the ground by test-pits, we endeavored to so plan the work, in shape and dimensions, as to give the greatest capacity for the least relative cost. This required that the high-water level should be placed four and one-half feet higher than was proposed in the report to the Committee, for the

receiving portion of the reservoir, and six and one-half feet higher than the distributing portion, or at an elevation of one hundred and eighty and one-half feet above high tide.

The plan of the reservoir is pyriform, to suit the character of the ground; it is about one thousand feet long and eight hundred and sixty feet wide at the base.

The area covered by the reservoir and embank-

ment is	- - - - -	14.0719 acres.
The area of the reservoir bottom is	- - -	9.5383 acres.
The area of the high water surface is	- - -	10.9467 acres.
The length of embankment, on the centre line, is	- - -	2,885.29 feet.
The length of the high water line, including	- - -	
lines on wing walls, is	- - - - -	2,873.33 feet.
The capacity of the reservoir is	- - -	51,156,544 gal-
lons, U. S. standard.	- - -	

The embankment is of earth, nineteen feet high above the bottom of the reservoir, and fifteen feet wide at the top, except where widened out near the inlet and outlet chambers, with side slopes of one and one half to one, or, in other words, running off a horizontal distance fifty per cent. greater than the height. The high water surface will be four feet below the top of the embankment.

The bottom, of the reservoir, slopes from the foot of the embankment to the bottom of the outlet chamber, which is one foot lower, to give facility for drainage. The embankment is formed of earth taken from the excavation, which, as a whole, is well adapted for the purpose, but lying as it does in masses of very different character, it requires to be very thoroughly mixed to get the best results. So much of the surface soil as was required to cover the outer slope and top of the embankment to a depth of one foot, was reserved in spoil banks for that purpose. The rest of the soil was mixed with other earth for the embankment.

The material used for puddle was also taken from the excavation, the largest portion of it being of a hard, compact char-

acter, the grains forming it being hard and sharp, and varying in size from an almost palpable powder to coarse grained sand or crushed stone, and found, by experiment, not to shrink in working. This was thoroughly mixed with a smaller portion of yellowish subsoil, and when well compacted made a very hard and apparently impervious mass. As found in the excavation, the material contained great numbers of stones considered too large to go into the puddle-wall. The most expeditious and effectual way to remove them seemed to be by screening through wire nettings of such sized mesh as to remove all stones more than one inch in diameter, which was accordingly done.

Experiments were made upon the two principal kinds of material found on the work, to ascertain what amount of shrinkage was to be expected from excavation to embankment; observations were also made upon the amount of void spaces contained in certain materials, as a means of judging what amount of finer material it would be necessary to mix with that, to make the most compact mass.

What is called heavy material, on the work, did not shrink at all, in the experiments. This was supposed to form about three-fifths of the excavation. The other, lighter material, supposed to form about two-fifths of the excavation, shrunk about thirteen per cent. of its bulk.

The estimated loss in the removal of stumps was about one thousand cubic yards, and that from the removal of grass roots and other vegetable matter was about eighteen hundred cubic yards.

The total estimated loss and shrinkage of material amounted to about nine and one-third per cent. on the total amount of excavation.

Three samples of sand, brought from a distance and used for concrete and mortar about the inlet and outlet chambers, were found, by measurement with water, to have void spaces amounting, in two cases, to thirty-six per cent. and in the other case to thirty-seven per cent. of the whole bulk.

Three samples of stone, suitable for concrete, which had been screened from the earth used for puddle, had in two cases forty-

two per cent. and in the other case forty-four per cent. of void spaces.

Three samples of broken stone, suitable for concrete, were found in each case to have fifty per cent. of void spaces.

Three samples of sand, brought from a distance, now on the work and yet to be used, were found to have, in two cases thirty per cent. and in the third, thirty-one per cent. of void spaces.

The surface soil, roots, loose stones, and other unsuitable material, were removed from the site of the embankment, so as to expose a suitable material on which the embankment could be raised. The amount of material thus removed was greater or less in different places.

The trench for the puddle wall was cut deeper than the general surface, for the foot of the embankment, and stepped on the sides to a narrow trench at the bottom.

A trench was also dug for puddle at the foot of the interior embankment slopes, six and one half feet wide and three and three quarters feet deep, from which the puddle was carried, in a layer two feet deep, over the natural earth, until it met and was joined with the vertical puddle wall in the interior of the embankment.

The material for puddle was applied in layers six inches in thickness, then properly moistened and thoroughly compacted by a grooved roller or by ramming, which compressed the layers to a thickness of about four inches.

The earth for embankment was applied in layers seven to nine inches in thickness, which, when properly moistened and well rolled with the grooved roller, were compressed to layers of about six inches in thickness.

The layers were so applied as to keep the sides of the embankment higher than the middle, forming a concave or dishing surface.

The earth embankment and puddle wall have been carried very nearly to the required height for soiling, excepting on the easterly side, between and about the inlet and outlet gate-chambers, and on a portion of the northerly side where the surface is at present about five and one half feet below such required height.

The interior slope of the embankment is to be lined with a layer of broken stone six inches thick, and a close, dry pavement of split stone over that, fifteen inches thick, with a concrete footing and coping.

The inlet chamber is at the south end of the reservoir, and the outlet chamber at the northeasterly extremity. They are to be connected by a brick conduit of four feet interior diameter and about nine hundred feet long, laid in the embankment outside of the puddle wall.

The bodies of the gate-chambers and wing walls are formed of rubble masonry laid in cement mortar, the exposed portion of the wing walls being laid with quarry-faced granite ashlar, and the piers and exposed faces of the chambers in dressed granite ashlar. The chambers are to be lined, after the work is thoroughly settled, with hard brick, of which the division walls and gate settings are also to be constructed.

Three lines of thirty-six inch pipes are laid under the embankment, to be used for force mains, terminating in separate cells within the inlet chamber, from which the water can at pleasure be turned into the reservoir or into the conduit connecting the two chambers. The outlet chamber is arranged with three cells in a similar way, with which thirty-six inch pipes are connected for leading mains. After passing through the embankment, these pipes will be reduced to thirty inch, or one or more of the leading mains may, in the future, be laid of the full size, into the city, if it is found desirable.

Arrangements are made so that water can be drawn into the leading mains from near the surface of the reservoir or near the bottom, at pleasure.

The stone masonry included in the contract is completed except in minor particulars.

It remains for you to contract for the brick masonry and the buildings proposed to be erected over the gate-chamber, the plans for which have been prepared.

The gates, ways &c., are under contract, but not much progress has been made towards their construction, as they will not be needed before next summer.

The general work on the reservoir was closed on the twelfth day of December, but the stone breaker is kept at work crushing stone for concrete, road-metal and slope lining, and men are also engaged preparing stone for the slope-paving. It is proposed that this work shall go on through the winter.

Measures have been taken to secure the reservoir embankment from injury by washing during the winter.

Owing to the very mild weather during the autumn and early winter, the earth work was carried on much later in the season than could have been reasonably expected; but on many mornings the surface was found slightly frozen, and considerable expense was incurred by the contractor in removing earth from the puddle, and in breaking up the surface of embankment to fit it for proper incorporation with material to be put on during the day. Coarse salt was sometimes strewn over the surface, on leaving the work, and where used in sufficient quantity it was very effectual in keeping out the frost. By preparing enough surface in this way for work in the early morning, time was gained for the sun to act upon other surfaces which were to be covered during the day, and thus the whole expense, compared with the work done, was not excessive.

The whole amount of work done upon the reservoir from the fourth day of May to the twelfth day of December inclusive, as estimated for payment, was:—

91,959 cubic yards	Earth Excavation at	-	-	\$	36
1,626 "	" " Rock	"	"	"	2 00
16,347 "	" " Puddle	"	-	-	40
59 "	" " Concrete	"	-	-	8 00
10 "	" " Broken Stone	"	-	-	3 00
784 "	" " Rubble Masonry	"	-	-	9 00
29.5 "	" " Cut-faced Ashlar	"	-	-	80 00
46.5 "	" " Quarry-faced Ashlar at	-	-	-	50 00
46 lineal feet	Drain Culvert	"	-	-	4 00
Setting 18	36 inch Iron Pipes, and 9 special castings for				550 00

In addition to the above, about forty-five hundred cubic yards of stone, suitable for concrete, slope-lining and road-metal,

were broken or screened from puddle, on which thirty-one hundred dollars have been advanced to the contractor, on account. No estimate has been made for the slope-paving prepared, nor for sand delivered.

The work at the pumping-station, and on the line of force-mains, has consisted mainly of excavation for the foundation of the engine house, to the level of the water-table; the construction of a sand embankment along the bank of the river, dividing the channel from the site of the proposed filter-basin, excavation to a small extent within that basin and for a road leading around it; the construction of two brick culverts of five feet and one of four feet interior diameter, with granite heads and wing-walls; the formation of three sections of high embankment for the force-main line, from cuts on the line and borrow-pits near, and the partial excavation of a roadway from the pipe line to the Pontiac road, and the construction of a highway bridge on the Pontiac road over the pipe line.

In addition to the labor of laying out and caring for this work, the engineering party stationed at Pettaconset has made surveys of most of the lands purchased or taken for water works purposes, and laid out for and superintended the construction of so much of the three dwelling-houses, being erected for the employees, as has thus far been executed.

Of the sand used for mortar at the pumping station, two samples were found by measurement to have, the one forty-two and five tenths per cent., the other forty-two and one tenth per cent. of void spaces. The measurement was made by filling a box containing one cubic foot, and accurately measuring the amount of water which the box would contain in addition to the sand. The sand was filled into the box at about the same degree of compactness as if measured for mortar in the ordinary way. Another sample, filled into the box until it was half full and then rammed, and having each shovelful after that rammed as it was put in, was found to have twenty-nine and two tenths per cent. of void spaces.

Two samples of gravel used in concrete were found to have,

the one twenty-nine and six tenths per cent., the other twenty-seven nine tenths per cent. of void spaces.

A sample of screened gravel from one of the test-pits had thirty-nine and two tenths per cent., and a sample of screened sand had thirty-six and seven tenths per cent. of void spaces.

A cast-iron pipe, eight inches in diameter, was sunk vertically near the middle of one of the proposed filter-basins to the depth of twenty four feet below the present surface of the ground, or about twenty-two feet below what we have assumed as the ordinary low-water stage of the river, and the bottom being open, the water is supposed to stand in the pipe at the same level as in the surrounding ground. A float was placed on the water in the pipe, carrying a point which rose and fell upon a gauge set to indicate the height of the water above tide level. Another gauge, also indicating the height above tide, is established at the river. The pipe is sunk at a point about one hundred and fifty feet from the bank of the river.

The observations upon these gauges at the present state of the river, varying from seven to eight and one-half or nine feet above tide, indicate that the water in the land rises and falls with the water in the river as that rises and falls by the varying quantity turned into it by the mills above, and that it even feels the check of the stream caused by the nooning at the mills, though the nearest of them are two or three miles up the river.

When the river is carrying the least amount of water, as during the night or on Sunday, and running at about seven to seven and one-half feet above tide, the water in the pipe usually stands from ten to seven inches higher than the water in the river. This difference in height depends upon the length of time during which the river is running at a low stage, and consequently upon the time given for the surface of the water in the land to fall from its steeper inclination, caused by the sudden fall in the river, towards the natural inclination which is due to the average supply of water passing from the land into the river at its low stage. But any rise or fall in the river, even with this difference of elevation between it and the water of the well in the basin, is felt at the well within half an hour, causing a rise or fall there.

In order to gain a fair knowledge of what had been adopted by different engineers, and in different places, for the thickness and weight of water pipes, I gathered such formulæ as could be conveniently obtained, and collated them in tabular form, and by profiles, and also compared by profiles the weights of water pipes of various sizes in actual use in many of the cities of the United States.

The formulæ used for the comparison of thicknesses as proposed or adopted by different engineers are as follows:—

1. James B. Francis, $t = .000058 H D + .0152 D + .312$

2. John Neville, $t = .0016 (n + 10) D + .32$

3. M. Dupuis, $t = .0016 n D + .013 D + .32$

4. John F. Ward, $t = .0002 H D + .30$

5. James P. Kirkwood, $t = \frac{5 p r}{c - p} + .40$

6. " " " $t = \frac{5 p r}{c - p} + \left\{ \begin{array}{l} .34 \text{ for } 6 \text{ inch pipe.} \\ .33 \text{ " } 8 \text{ " " } \\ .32 \text{ " } 12 \text{ " " } \\ .28 \text{ " } 20 \text{ " " } \\ .25 \text{ " } 30 \text{ " " } \\ .24 \text{ " } 36 \text{ " " } \end{array} \right.$

7. Modification of
Mons. Dupuis'
formula sug-
gested by Mr.
Kirkwood, $\left. \vphantom{\begin{array}{l} \text{Modification of} \\ \text{Mons. Dupuis'} \\ \text{formula sug-} \\ \text{gested by Mr.} \\ \text{Kirkwood,} \end{array}} \right\} t = 3.4 n (.0016 D) + \left\{ \begin{array}{l} .40 \text{ for } 6 \text{ \& } 8 \text{ in. pipe.} \\ .39 \text{ " } 12 \text{ " " } \\ .38 \text{ " } 20 \text{ " " } \\ .37 \text{ " } 30 \text{ " " } \\ .36 \text{ " } 36 \text{ " " } \end{array} \right.$

8. J. F. D'Aubuisson, modified, $t = .00025 H D + .39$

9. Wm. J. M. Rankine, $t = \sqrt{\frac{D}{48}}$ } the largest result

10. " " " " $t = \frac{H D}{12,000}$ } to be used.

11. Thos. J. Whitman, $t = .0045 n D + .4 - .0011 D$

12. Thomas Box, $t = \left(\sqrt{\frac{D}{10}} + .15 \right) + \frac{H D}{25,000}$

13. Molesworth, $t = .000054 H D + \begin{cases} .37 \text{ for under 12 inch} \\ .50 \text{ " 12 to 30 " } \\ .62 \text{ " 30 to 50 " } \end{cases}$

14. Proposed, for diameters greater than 36 inches, $\left. \begin{array}{l} \\ \end{array} \right\} t = .00008 H D + .0125 D + .33$

15. Adopted, for Providence Water Works, $\left. \begin{array}{l} \\ \end{array} \right\} t = .00008 H D + .01 D + .36$

t = thickness in inches.

H = head in feet.

D = diameter in inches.

n = number of atmospheres of pressure at 33 feet each.

p = pressure per square inch in pounds.

r = radius of pipe in inches.

c = cohesion of the iron, as allowed, being in No. 5 7,500, and in No. 6 5,000, pounds.

The third formula, adopted in his practice by M. Dupuis, engineer of the Paris Water Works, is in the form given by Mr. Neville in his "Hydraulic Tables," etc.

Mr. Ward would, in no case, take H at less than 100.

The eleventh, twelfth and thirteenth formulæ are found in a little book of useful information issued by R. D. Wood & Co., of Philadelphia.

The thicknesses of pipes as cast by Glasgow founders were also compared with the others, but I have no formulæ for their expression.

The weights of pipes compared, were those adopted as follows:—

By	Baltimore,	By	New Bedford,
"	Boston,	"	New York,
"	Brooklyn,	"	Philadelphia,
"	Cambridge,	"	Trenton,
"	Chelsea,	"	San Francisco,
"	Chicago,	"	St. Louis,
"	Newark,	"	Warren Foundry, Stock.

I trust that the result of these examinations and comparisons, as expressed in formulæ Nos. 14 and 15, will prove to be perfectly safe in our practice, and that we have not used more iron than ought properly to be used to insure such safety.

The pipes for the force main and for the leading main, are cast in four classes, of different thicknesses, depending on the head of water to which they are to be subjected. Those for distribution are cast in two classes.

The weights are estimated, at 0.261 lb. per cubic inch, for pipes measuring twelve feet in length, including the bells. A variation of four per cent. is allowed in the weights of single pipes, and the gross weight of the pipes of a given contract is allowed to exceed the standard weight two per cent. for each diameter. The weights of the several pipes are marked on them at the foundry, but they are re-weighed for payment, on receipt at the wharf in Providence.

The following schedule gives the thickness and weight for each class of each diameter and the greatest proposed hydrostatic head under which the pipes are to be used:

SCHEDULE.

Nominal Diameter, Inches.	Class.	Thickness of Metal, Inches.	Standard Weight, Pounds.	Greatest Proposed Head.
6	B	$\frac{1}{2}$	402	180
8	A	$\frac{1}{2}$	533	100
8	B	$\frac{9}{16}$	590	180
10	A	$\frac{17}{32}$	700	100
10	B	$\frac{19}{32}$	772	180
12	A	$\frac{9}{16}$	885	100
12	B	$\frac{21}{32}$	1,016	180
14	A	$\frac{13}{32}$	1,082	100
14	B	$\frac{11}{16}$	1,236	180
16	A	$\frac{21}{32}$	1,375	100
16	B	$\frac{3}{4}$	1,533	180
18	A	$\frac{11}{16}$	1,594	100
18	B	$\frac{25}{32}$	1,789	180
20	A	$\frac{23}{32}$	1,852	100
20	B	$\frac{27}{32}$	2,143	180
24	A	$\frac{13}{16}$	2,502	100
24	B	$\frac{15}{16}$	2,850	180
30	a	$\frac{13}{16}$	3,155	60
30	A	$\frac{29}{32}$	3,484	100
30	b	1	3,809	140
30	B	$1\frac{1}{16}$	4,026	180
36	a	$\frac{7}{8}$	4,101	60
36	A	1	4,627	100
36	b	$1\frac{1}{8}$	5,148	140
36	B	$1\frac{1}{2}$	5,667	180

The diameters are nominal, but no pipes or special castings have less interior diameter than that specified as nominal, and the thickest pipe approximates closely to that diameter. The exterior diameters of all classes, or thicknesses, of pipes are required to be the same for each specified nominal diameter, the variations in thickness of metal being made by changes in the interior diameter.

The exterior diameters of the pipes, and the whole of the bells, being the same for every class, there is no trouble in laying pipes of one thickness in connection with those of another thickness.

The depths of the bells are in proportion to the diameters of the pipes, from two inches for the six-inch pipes, to four inches for those of thirty-six inches diameter. The special castings have bells one inch deeper than is due to the diameters of the pipes to which they belong.

All the pipes are cast vertically. The specifications require that they shall be cast with the bell end down, but as the fixtures for small pipes were not fitted for it I allowed one foundry, on condition that a separate core be made for the bell, to make pipes of twelve inches diameter and less with that end up, resulting thus far in quite perfect and handsome castings, with unvarying depth of socket. The plan of using a separate core is liked very much at the foundry, where it will probably be adopted for small pipes in their general work.

After being coated with coal-pitch varnish while hot, the pipes are subjected to hammer inspection while under a hydrostatic pressure of three hundred pounds to a square inch.

The tensile strain of the iron used was required to be at least sixteen thousand pounds per square inch, which is rather less than that usually specified, so far as I know; but we had at first some trouble in getting specimens which would uniformly bear this strain, though as now made the pipes are of rather stronger iron than we care, on account of the resulting change in brittleness, to have used.

Some three hundred samples have been broken, and the ordinary range of strength is from about eighteen thousand to about twenty-eight thousand pounds to a square inch.

The specifications for the manufacture of pipes, on which the iron-founders bid, were carefully drawn, and required good pipe. Much complaint has been made in regard to the strictness of our adherence to the specifications, but no pipes have been rejected which were believed to be safe for our use, and it is hoped that our adherence to the requirements of the contracts may tend to improve the character of all the pipes we receive.

The right of rejection for imperfections is good at all times until the final completion and adjustment of the contract.

Much labor has been spent upon the plans for the location of the pipes, and the determination of their proper sizes. It has been our effort to so arrange the distribution as to deliver the water at its destination by the shortest practicable route, and at the same time to provide for a fair supply to all sections in case of the main arteries to those sections being cut off temporarily by accident or otherwise.

Estimates were made of the probable amount of water needed at present and prospectively in all sections of the city, and the smaller pipes were designed for a liberal supply for many years to come; leaving the larger mains, which will be needed when there is a largely increased demand, to be added from time to time as they are required.

As a guide in the determination of the most economical sizes for pipes, to carry certain quantities of water, I caused calculations to be made of the relative cost of pumping the water to an additional head necessary to carry a certain quantity of water through a small sized pipe, and the cost of an increased size of pipe necessary to convey it at a less velocity, and consequently with less head. These calculations were based on an assumed uniform duty of 500,000 foot pounds per pound of coal, and a cost of nine dollars per short ton of coal burnt in the furnace. The cost of iron pipe is taken at fifty dollars per ton. The difference in cost of laying will not materially affect the question. The loss of head result-

ing from greater velocity is calculated from Darcy's formula for new cast iron pipes.

The result is as follows :—

Diameters of Pipes.	Greatest allowable velocity.
6 inches	2.526 feet per sec.
8 " "	2.405 " "
10 " "	2.583 " "
12 " "	2.904 " "
16 " "	2.929 " "
20 " "	2.990 " "
24 " "	3.224 " "
30 " "	3.488 " "

The 30 inch pipe is compared with a 36 inch. If the demand for water at a given point is such as to require a greater velocity than is given opposite a certain sized pipe, then the next larger sized pipe should be used in that place.

As the velocities given are the greatest allowable for that size of pipe, and as the loss of head is based on experiments upon new pipes, free from rust and accretions, which will increase the loss of head, I have assumed two feet per second as a general guide for the velocity of flow in the distribution, and the sizes of the pipes have been determined accordingly. Perhaps a greater velocity might have been allowed in the larger pipes, but as the influence of those pipes extends over a greater area, and I understand it to be your wish to have all decisions lean towards a thorough efficiency in the work, it was thought best to adopt a uniform rate. This will also, by increasing the sizes of the larger mains, have a tendency to delay the increase in their number, which increase must, however, come at a later time.

The contract for laying pipes required that

1,800 feet of 36 inch force main,

27,150 feet of 30 inch leading main, and

3,000 feet of 24 inch leading main,

be completed on or before the first day of December last; but numerous causes, among them the non-receipt of pipes in the

order required, have tended to interfere with the work, and it closed on the 30th of December, with the following amounts laid :—

FORCE MAIN, 36 INCH PIPE.

From Station 21.26 to Station 38.004.

29 pipes of class B,	- - -	352.42 feet,
81 " " " b,	- - -	984.37 "
10 " " " A,	- - -	121.53 "
18 " " " a,	- - -	218.74 "

138 pipes.	Total,	-	1,677.06 feet laid.
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Average per pipe, 12.153 feet.

LEADING MAIN, 30 INCH PIPE.

From Station 3.582 to Station 27.50.

87 pipes of class a,	- - -	449.81 feet
40 " " " A,	- - -	486.28 "
117 " " " b,	- - -	1,422.37 "
3 " " " B,	- - -	36.47 "

197 pipes.	Total,	-	2,394.93 feet laid.
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Average per pipe, 12.157 feet.

From Station 39.89 to Station 91.38.

159 pipes of class B,	- - -	1,935.70 feet
264 " " " b,	- - -	3,213.56 "

423 pipes.	Total,	-	5,149.26 feet laid.
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Average per pipe, 12.173 feet.

From Station 108.09 to Station 128.

118 pipes of class b,	- - -	1,435.42 feet.
4 " " " B,	- - -	48.65 "
<hr/>		
122 pipes,		1,484.07 "
Add for two branches,	- -	7.00
<hr/>		
Total,	-	1,491.07 feet laid.

Average per pipe, 12.164 feet.

From Station 145.96 to Station 154.88.

69 pipes of class b,	- - -	889.96 feet
4 " " " B,	- - -	48.69 "
<hr/>		
73 pipes,		888.65 "
Add for one branch,	- - -	8.67 "
<hr/>		
Total,	-	892.32 feet laid.

Average per pipe, 12.173 feet.

Total length of Leading Main laid, 9,927.58 feet,

SUMMARY.

Total number of pipes laid,	- -	958
Total length of pipe laid,	- -	11,593.97 feet.
" " " branches,	- -	10.67 "
<hr/>		
Total length of pipes and branches,	-	11,604.64 feet laid.
Force main, 1,677.06 ft. 36" pipe =		0.3176 miles.
Leading " 9,927.58 " 30" pipe =		1.8802 "
<hr/>		
Total,	-	11,604.64 " 2.1978 miles.

The stationing is measured horizontally.

Notwithstanding the delays which have occurred in laying the pipes during the past year it is supposed that we shall receive all that are proposed to be laid next season in ample

time for the purpose, and that by employing four gangs of pipe layers we shall be able to put in, by the first of August, all that are now contracted to be laid.

Though the pipe-laying is stopped for the present, the work of blasting for pipe trenches, on the force main and on the leading main, is still going on, and it is hoped that both these lines may be connected with the reservoir during the winter.

About thirty-three thousand cubic yards of earth have been removed in grading for the highway on the line of leading main between the Reservoir and the Stonington Railroad.

About eight thousand feet B.M. of sheet piling have been driven. About two hundred cubic yards of rubble and about six cubic yards of granite ashlar have been laid for the abutments of a bridge over the Pochasset river. These abutments were, by contract, to have been completed on the first day of November. About one fifth of the masonry is yet to be laid. The other materials, excepting two wrought iron girders, are ready for the completion of an iron bridge as soon as the abutments are finished.

Very careful and elaborate investigations have been made in regard to pumping engines, and considerable progress has been attained in the plans for them. A mistake in this matter might be disastrous, and any gain in efficiency or simplicity, without loss in other respects, would be very valuable and well worth great efforts to obtain. We shall gain time for thorough and complete designs, by putting up a temporary engine for the first supply of the city. Such an engine is now in process of construction by Mr. Henry R. Worthington, of New York, under contract for its completion in running order on the first of next August. Your conclusion to put up this temporary engine has, I think, made the introduction of water into the city during this year very probable, and has relieved us of many disadvantages which would attend the construction of permanent engines, with adequate wells and foundations, within so short a time.

Designs have been made in our office for the valves, or gates, to be used in the distribution and on the mains, and specimens of eight inch and twenty-four inch sizes for use in North Main street are in process of construction.

Bids have been received from three competent manufacturing parties for making the whole number required, and bids are expected from two others within a few days. It is believed that such data as you will require, in order to contract for these important parts of the work, can be furnished within a short time and in good season for their completion before they will be needed.

The valve is designed to be parallel-faced, with a single disk, which will drop below the pipe for all sizes more than twelve inches in diameter, and rise above it for those of twelve inches and under. In these respects the valve is not new.

We have also made designs for the construction of a hydrant, which it is hoped will combine many of the advantages, and be free from some of the disadvantages, of the hydrants now in use.

Its location will be on the sidewalk, just inside the curbstone, and it will be supplied with water through a branch to the street main, eight inches in diameter, forming a portion of the body of the hydrant. No part of the permanent portion of it will be above the surface of the sidewalk, to make an obstruction there, but, for use, a movable head, or chuck, one of which will be carried by each hose-company and one with each engine, will be attached to it, making in effect a post-hydrant, for the time being, capable of supplying four lines of hose with separate gates for shutting off each at pleasure.

One of these hydrants is now nearly completed for trial, and it will be thoroughly tested in every way, so that any necessary changes may be made in order to have it as nearly perfect as possible before being adopted on the work.

Many of the tools necessary for its manufacture have been made, as they were almost indispensable even for the first one, and will be worth their entire cost to any one who is success-

ful in competing for the contract to furnish the works with such number of hydrants as you may think best to call for.

Some, at least, of those who are expected to bid for the work, have ample facilities for making all that will be required, in good season for use.

While making the underground examinations in the basin at the pumping station, we found a peculiar material lying at varying depths below the surface in a large bed on the westerly side of our proposed excavation. On being poured from the bucket in which the material was brought up, the water, coming with it, carried upon its surface what seemed to be an oily substance, with quite bright and variegated colors. The material is formed of very fine particles, nearly black, and when dry it is compact and impervious, but on being acted upon and diluted by water it runs somewhat like oil, and when the eight-inch pipe used in sinking the artesian wells was left over night in it, the surface of the material would, in the morning, be found several feet higher in the pipe than it was the night before.

Though its depth below the surface, and its position in reference to our proposed excavation, is such as to give us no great fear of trouble from it, yet it may be that water flowing over its surface will afterwards reach the basin and mingle with the waters supplied to the city. In view of this possibility, I sent to Professor Appleton two samples of the material, and one sample of a mixture of the material with water, as drawn from one of the wells which was sunk into it, with the request that he would ascertain whether any injurious matters were contained in, or accompanied, the specimens. He found no reason to think that any harm could come to the water from a mixture of this material, even if that should take place to a much greater extent than seems possible, and the fact that neighboring wells are sunk in it, and have their visible supply of water held entirely in the material, without causing any trouble, except that the water is hard and slightly brackish, sustains this view.

I have appended Professor Appleton's written report in regard to this subject.

Examinations are now being made by Professor Appleton to ascertain the action of the Pawtuxet water on various kinds of pipes used, or proposed to be used, for service pipes. This is being done in accordance with your vote authorizing such experiments to be made on the Pawtuxet water, and on water supplied to other cities.

It is proposed, also, to send a sample of the water to Professor Chandler, of New York, whose experience in such matters is well known, with the request that he will make such tests as he thinks may be useful, in regard to its action on pipes.

It is understood to be your wish that great care be exercised in gaining a knowledge of every essential element to a right decision in regard to the kind of service pipes to be used on these works, as the question is a very important one, and should be decided independently for every separate water supply, on account of the great difference which is known to exist between different waters in their action on metals.

Your quarterly reports have given information in regard to the engineers whom you have appointed as assistants on the work. I think the city is fortunate in obtaining such good service as has generally been rendered by them, upon which so much of the success and good character of the work depends.

I am your obedient servant,

J. HERBERT SHEDD,

Chief Engineer.

BROWN UNIVERSITY LABORATORY, }
 PROVIDENCE, Jan. 28, 1870. }

J. HERBERT SHEDD, Esq.,

Chief Engineer of Water Works.

DEAR SIR:—I received from you, Nov. 30th, 1869, two samples of soil or earth for chemical examination. They were marked respectively A and B.

Sample A.

Contained of moisture,	- - -	6.28 per cent.
of matter soluble in water,	- - -	.15 " "
made up of {	soluble organic and volatile,	.06 " "
	soluble mineral matters,	.09 " "

Sample B.

Contained of moisture,	- - -	5.00 per cent.
of matter soluble in water,	- - -	.25 " "
made up of {	soluble organic and volatile matter,	.16 " "
	soluble mineral	.09 " "

As the most important point with respect to these soils was the action of water upon them, the thing to be determined was the amount of soluble matter in them, that is, the amount of matter that would be dissolved by the action of water.

It will be seen from the statement above, that in each case this amount was extremely small—so small as in my opinion to give no ground for fear of contamination of water from this source.

These soils were further examined by aid of the microscope. By this means they appeared to consist of two parts:—

1. A fine part, of no characteristic appearance.
2. A coarse part, which seemed to consist of quartz and fragments of coal.

Dec. 18th, 1869, I received from you a sample of water for analysis. It was from the same neighborhood as the soil above mentioned and was very turbid from the presence of a large amount of mineral matter.

The total amount of matters, suspended and dissolved, was about 393 grains per American gallon, but of this large amount only 11 grains came under the head of organic and volatile matters. Further, these latter materials, upon ignition, evolved no flame, showing absence of any appreciable amount of oily matter.

A portion of the water was carefully filtered, and the filtrate was evaporated for the purpose of determining the amount of matters dissolved, as compared with those merely suspended.

The results were,

Total matters,	-	-	-	-	-	16.6	gr. to Am. gal.
made up of {	organic and volatile -					1.2	" "
	mineral, -					15.4	" "

But these results are a little too high because of the extreme difficulty of making the water perfectly clear: nevertheless they are sufficiently accurate for the purpose.

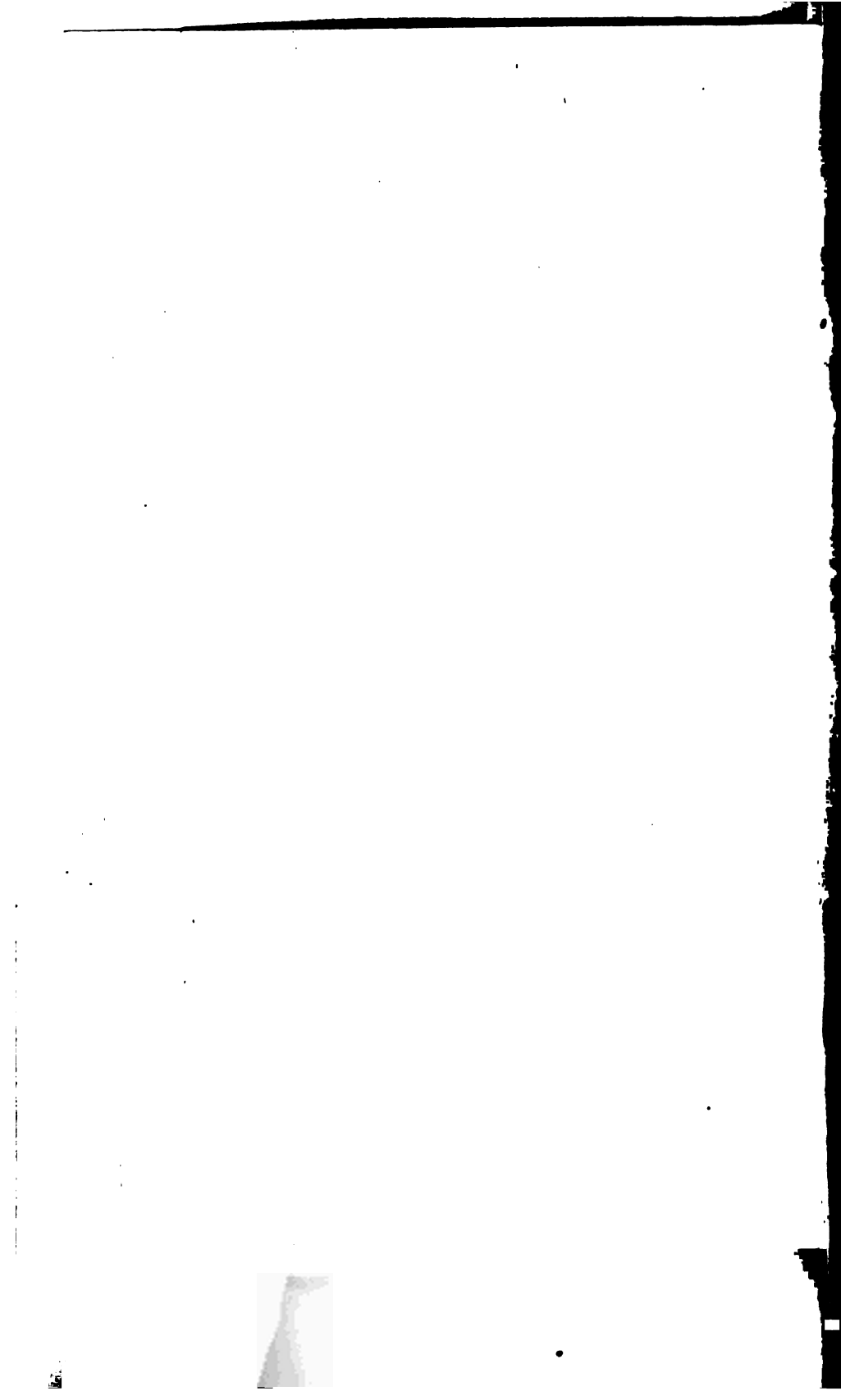
Yours, respectfully,

JOHN H. APPLETON,

Professor of Chemistry.







1873-74.

CITY DOCUMENT.

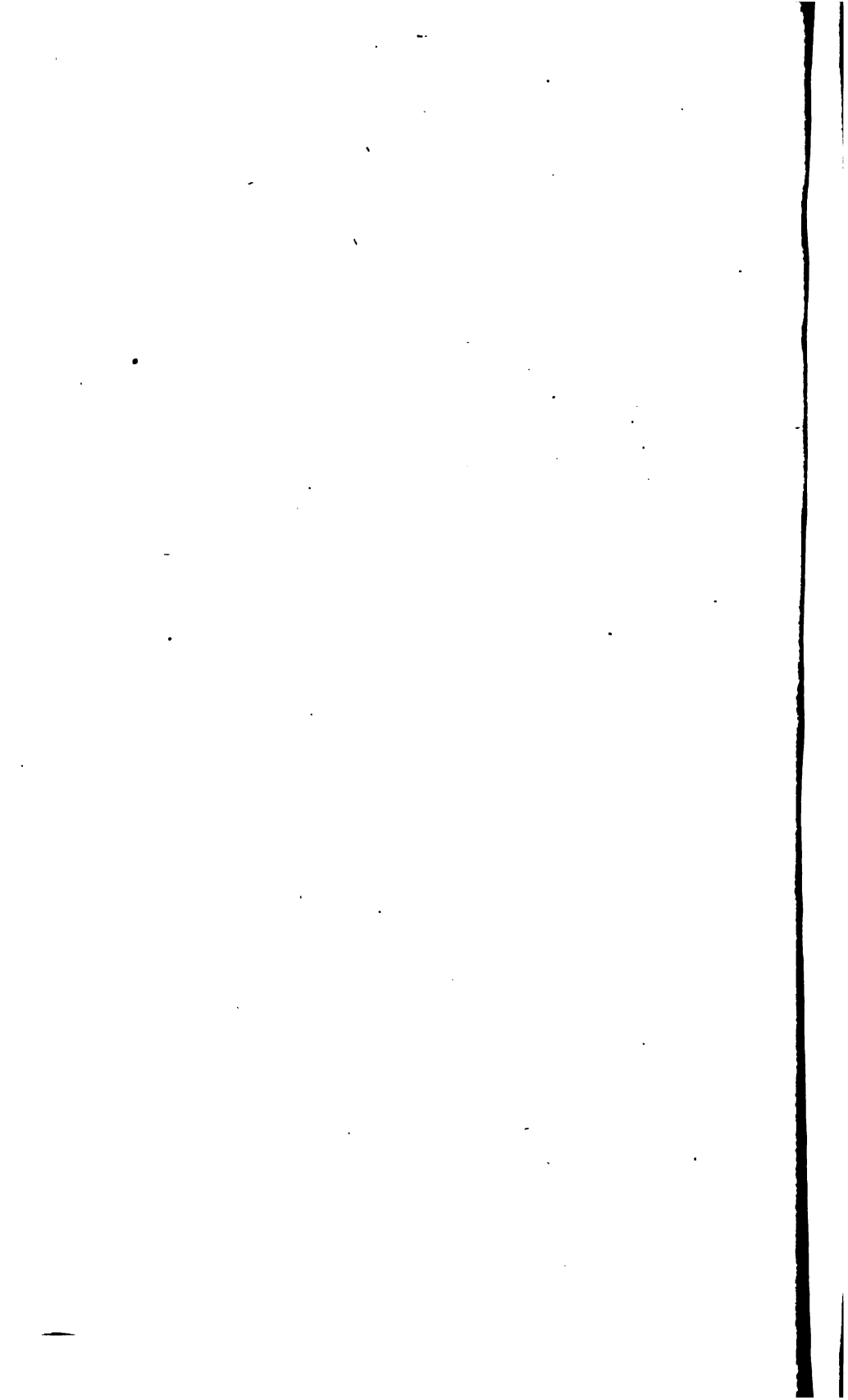
No. 27.

SIXTEENTH QUARTERLY REPORT
OF THE
WATER COMMISSIONERS
OF THE
CITY OF PROVIDENCE,

OCTOBER 1, 1873.



PROVIDENCE:
HAMMOND, ANGELL & CO., PRINTERS TO THE CITY.
1873.



1873-74.

CITY DOCUMENT.

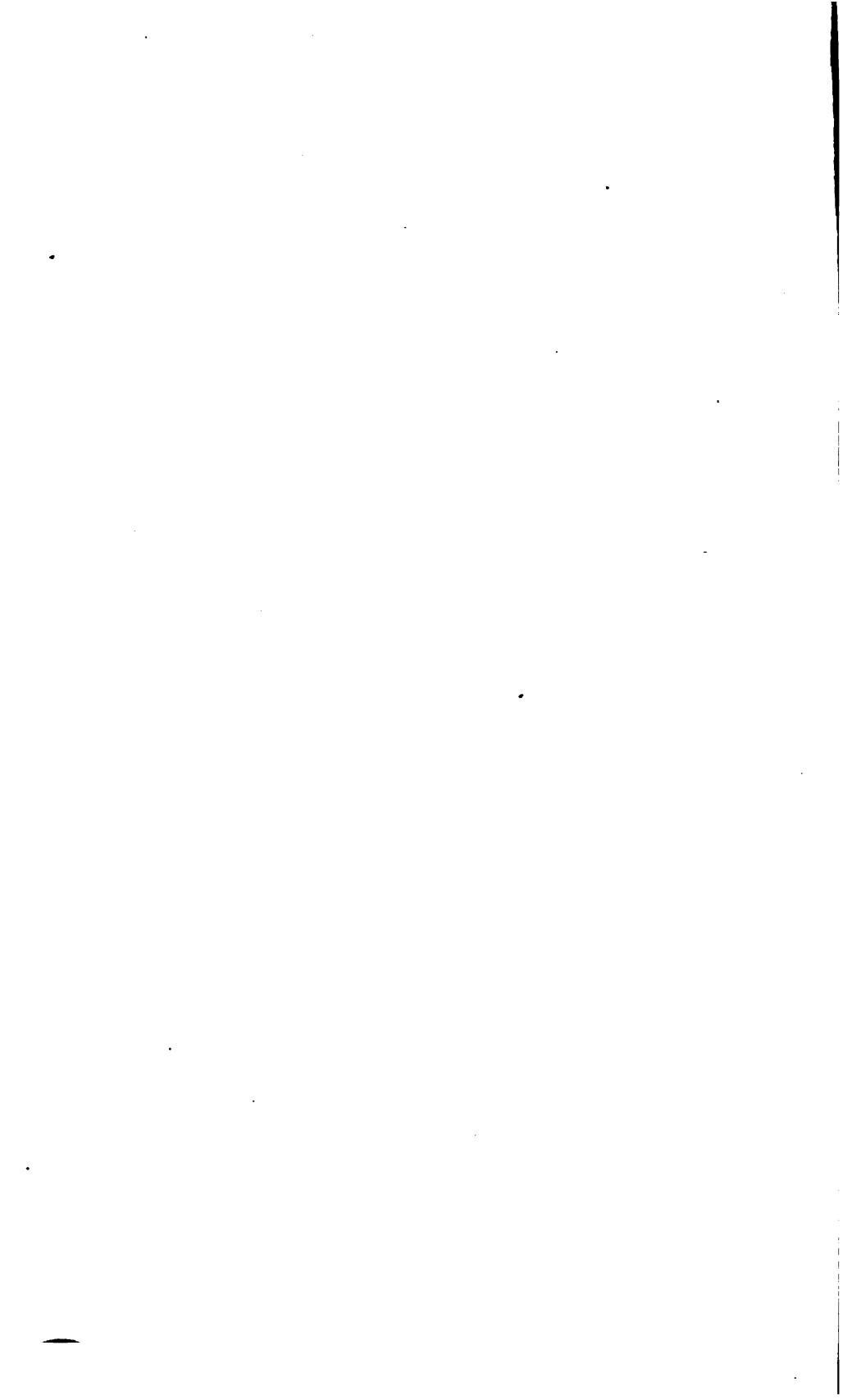
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ORGANIZATION
OF THE
PROVIDENCE WATER WORKS.

WATER COMMISSIONERS.

JOSEPH J. COOKE, PRESIDENT.

CHARLES E. CARPENTER,

WILLIAM CORLISS.

SECRETARY OF THE WATER COMMISSIONERS.

CLINTON D. SELLEW.

Office No. 35 North Main street.

CHIEF ENGINEER.

J. HERBERT SHEDD.

Office No. 35 North Main street.

REPORT.

OFFICE OF THE WATER COMMISSIONERS, }
PROVIDENCE, October 1st, 1873. }

TO THE HONORABLE THE CITY COUNCIL:

The undersigned, Water Commissioners, respectfully present their Sixteenth Quarterly Report:

The salary of Clinton D. Sellew, Secretary, has been increased to twenty-four hundred dollars per annum, from July 1, 1873.

The salary of Philip S. Chase, commissioners' clerk, has been increased to fifteen hundred dollars per annum, from July 1, 1873.

* The salary of William H. Turner, clerk in the Engineering department, has been increased to twelve hundred dollars per annum, from July 1, 1873.

The salary of Walter F. Slade, service pipe clerk, has been increased to one thousand dollars per annum, from July 1, 1873.

The salary of S. Horace Wheeler, inspector of service pipes, has been increased to fifteen hundred dollars per annum, from July 1, 1873.

The salary of William F. Janes, assistant service pipe engineer, has been increased to eight hundred dollars per annum, from August 1, 1873.

Leonard N. Austin, Jr., of Providence, has entered upon the duties of commissioners' clerk, on trial, with a salary of eight hundred dollars per annum.

The commissioners, in their report of January 1st, 1873, say that they have agreed with Thomas J. Hill, for the continued occupancy of a portion of his wharf, for one year from February 1, 1873, at a rent of two thousand dollars per annum, with a conditional privilege of another year at the same rent. Mr. Hill was duly notified that the commissioners had elected to continue the occupancy, and he made no objection thereto. The agreement for such occupancy, is now, therefore, complete.

John W. Mathewson & Co., Greenville, Smithfield, R. I., have agreed to furnish dimension foundation stone for chimneys and retaining walls, according to plans and specifications, delivered on the ground at Pettaconset, for twenty-five dollars per cubic yard, measured in place.

An offer of W. A. Burdick, Agent, to furnish a granite drinking-trough according to plans and specifications, for use at the junction of South Main and Wickenden streets, for the sum of two hundred dollars, was accepted.

A contract has been made with W. A. Burdick, Agent, to furnish and deliver at Pettaconset, granite for the engine and boiler-house for the sum of thirty-two thousand dollars.

An offer of Fales, Jenks & Sons, to do the gate and valve work for Hope Reservoir chambers, for the sum of seventeen hundred and ninety-two $\frac{20}{100}$ dollars, "tubing and bolts at cost, extra," was accepted.

An offer of Hopkins & Pomroy, to deliver one thousand tons "Old Company," Lackawanna coal, broken, part at Hope pumping-station, at \$7.25 per ton of 2000 lbs., and part at Pettaconset, at \$8.00, was accepted. Their offer to furnish the

quantity required at Pettaconset for the month of August last at \$7.75 per ton, was also accepted.

Proposals for furnishing 1000 tons of 2240 lbs. cast iron water pipes, from eight inches to sixteen inches in diameter, and separate proposals for 2040 tons thirty inches in diameter, were opened on 9th September, ultimo. The proposal of the Gloucester Iron Works, Gloucester City, Camden County, N. J., for furnishing the thirty-inch pipes at \$53.91 per ton of 2240 lbs. to be delivered on wharf in this city, on or before the 1st day of June, 1874, was accepted, and all other proposals were rejected. On the same day a bargain was made for the other and smaller pipes, with the Warren Foundry and Machine Company at \$58.50 per ton of 2240 lbs., one half to be delivered this Fall and the remainder early in the Spring. The contracts have been duly executed.

An agreement has been made with S. F. & J. A. Gray, of Danversport, Mass., for the delivery, on wharf in this city, of 130,000, (more or less, as may be needed to complete the building,) best Danvers face bricks for engine and boiler-house at Pettaconset, at \$25. per M., one half to be delivered this Fall and the remainder early in the Spring.

An offer of W. A. Burdick, agent, to furnish granite for retaining walls near the coal vaults at Hope pumping-station, for \$1.50 per cubic foot, has been accepted.

The Commissioners have been furnished with a certified copy of the following resolutions passed by the town of North Providence, April 7th, 1873 :

" Resolved, That whenever the Water Commissioners of the city of Providence shall extend the water pipes into any portion of this town, for the purpose of supplying water to any persons or corporations of this town, the said commissioners be and they are hereby requested to set fire hydrants along the highways of this town, in which said pipes are laid, at the

same distance from each other as the fire hydrants are set in said city.

"Resolved, That this town will pay for such hydrants so located, the same price per annum as is paid by the city of Providence for the fire hydrants in the streets of said city.

"Resolved, That the Board of Engineers of the city of Providence be and they are hereby requested to take charge and control of said fire hydrants, so located in this town, in the same manner as though said hydrants were in said city of Providence.

"Resolved, That it be hereby recommended for the citizens in the districts of this town when any such hydrants are located to organize Hose Companies for the use of such hydrants and for the better protection of their property from fire.

"Resolved, That permission is hereby given to the Water Commissioners of the city of Providence to lay a twelve-inch water pipe across Tar Bridge in the roadway thereof, the same to be done in such manner as to not obstruct."

The following resolution was adopted by the Water Commissioners, 24th ultimo, Mr. Cooke voting in the negative:

Resolved, That the Chief Engineer is hereby requested to cause all work on the engine house at Pettaconset, necessary only for Cornish Engines, to be suspended.

The gate-houses at Sockanosset Reservoir have been completed.

The Corliss Engine, for the High Service, has been erected at Hope Pumping Station. It was put in motion 3d September, ultimo, but has not yet pumped water into the distribution pipes. Mr. Corliss, in the meantime, has been engaged in altering and adjusting details, and has given the commissioners no notice of readiness to pump.

The average daily consumption of water, including leakage has been, for the last quarter, about 2,100,000 gallons.

High water in Sockanosset Reservoir is 180½ feet above

mean high tide in Providence river. At 7 o'clock this morning the height of water in the reservoir was 180.54 feet.

Considerable progress has been made during the last quarter in the construction of Hope Reservoir.

The following old drinking troughs are now supplied with Pawtuxet water :

Exchange Place ;	Junction North Main and
Broad Street ;	Benefit streets ;
Junction High and Westminster	Charles street ;
streets ;	Canal street ;
Junction High and Cranston	Bassett street.
streets ;	
Junction Federal and Kenyon	
streets ;	

New drinking troughs have been placed
In Waterman street, at Red Bridge, and
At Junction of South Main and Wickenden streets.

The drinking fountain which was last year placed in Public street, near Greenwich street, and which was broken down by a runaway team, has been replaced with one which is more approved.

A drinking fountain has been set in Angell street, near Brown Street, the whole cost of which was defrayed by Mr. Frank E. Richmond.

The Athenæum drinking fountain, erected by Mrs. Anna Richmond, has been supplied with water.

A self-closing drinking fountain has been placed at the junction of Westminster and Weybosset streets.

An ornamental fountain furnished by private subscription, for the setting of which an appropriation was made by the City Council, has been placed in Abbott Park Place.

The following old drinking troughs are to be replaced by new ones :

Eddy Street ; Dexter street ; Wickenden street and India street.

Plumbers' licenses have been issued as follows :

Henry L. Norris, John McKenzie.

The number of Plumbers' licenses issued to date is thirty-seven.

The following statement shows the length of pipes laid during the last quarter ; the sizes of the pipes ; where laid, and the totals since the commencement of the work :

24 INCH.

In College street,	5 feet.
Including 1 branch.	
Previously,	18,810 feet.
Total,	<u>18,815 feet.</u>

20 INCH.

In Adelaide and Brayton avenues, and in Broad street,	487 feet.
Including 4 cut pipes, 5 branches, 8 curved pipes, 1 gate, and 2 reducers.	
Previously,	6,073 feet.
Total,	<u>6,560 feet.</u>

16 INCH.

In Broad, Cranston and North Main streets, and in Branch, Brayton and Thurber's avenues,	1,885 feet.
Including 15 cut pipes, 14 branches, 3 curved pipes, 4 gates, and 2 reducers.	
Previously,	13,686 feet.
Total,	<u>15,571 feet.</u>

12 INCH.

In Broad, Cranston, Messer and North Main streets,	6,678 feet.
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Including 31 cut pipes, 44 branches, 2 curved pipes, 9 gates, 2 bevel hubs, and 1 reducer.

Previously, 17,849 feet.

Total, 24,027 feet.

10 INCH.

In Cove street, 19 feet.

Including 2 branches.

Previously, 7,653 feet.

Total, 7,672 feet.

8 INCH.

In Acorn, Camp, Davis, Dorrance, Knight, Martin and Promenade streets, in Douglas Avenue and in Hartford road, (Johnston),

6,969 feet.

Including 31 cut pipes, 46 branches, 5 curved pipes, 11 gates, 1 bevel hub, and 2 reducers.

Previously, 49,855 feet.

Total, 56,824 feet.

6 INCH.

In A, Almy, Arnold, Bowen, Cedar, Chaffee, (North Providence), Charles Field, College, Cory, Cottage, Dawson, Dexter, Diamond, Division, Dorrance, Eddy, Ford, Fountain, Hammond, Harkness, High, Howell, Hudson, Jackson, Jefferson, Jenckes, Jenkins, John, Lloyd, Meader, Mulberry, North Court, Oak, Orms, Paine, Park, Penn, Pike, Plainfield, (Johnston), Pratt, Public, Sheldon, Sprague, Spruce, State, Superior, Tobey, Transit, Valley, Wayland, West Exchange, West Park, Willow, and Woodland streets, in Belle View, Doyle

and Wayland Avenues, Oliver Place, Oak Court, for Fuller Iron Works from Pike street, and for Providence Tool Company from Central and from Whelden streets, and for O. A. Ballou from Lloyd street,		34,463 feet.
Including 196 cut pipes, 105 branches, 26 curved pipes, 72 gates, 20 bevel hubs, and 1 reducer.		
Previously,		267,890 feet.
Total,		<hr/> 302,858 feet.
Total of all sizes during the last quarter,		50,506 feet.
or 9.56 miles.		
Previously, including 30 and 36 inch, of which none have been laid during the last quarter,		427,164 feet.
Total,		<hr/> 477,670 feet.
or 90.46 miles.		

Ninety-six fire hydrants have been set since the date of the last quarterly report, one in each of the following locations, those marked * being in North Providence, and those marked † in Johnston.

A	street,	south-east corner of Perkins street.
Acorn	"	east side, about half way between Spruce street and Cedar street.
"	"	south-east corner of West Exchange street.
Arnold	"	south-west corner of Thayer street.
Belle View Avenue,		north side, about 440 feet east of Cranston street.
"	"	north side, about 900 feet east of Cranston street.
Branch	"	south-west corner of Thurber's Lane.
Broad	street,	east side, opposite north line of Potter's avenue.

Broad	street	south-east corner of Short street.
"	"	east side, opposite south line of Congress street.
"	"	east side, about 140 feet south of Square street.
"	"	south-east corner of Gallup street.
"	"	east side, about 80 feet north of Thurber's avenue.
Bowen	"	north side, about 180 feet west of Prospect street.
Camp	"	north-east corner of Pleasant street.
"	"	south-east corner of Locust street.
"	"	north-east corner of Cypress street.
*Chaffee	"	north-west corner of Capron street.
Charles Field	"	south side, about 200 feet east of Brook street.
Cranston	"	north-east corner of Belle View avenue.
"	"	east side, about 70 feet north of Althea street.
"	"	north-east corner of West Elmwood avenue.
"	"	east side, about half way between Dahlia street and Lilac street.
"	"	east side, about half way between Jessamine street and Potter's avenue.
"	"	north-east corner of Anthony street.
"	"	east side, about 15 feet north of Stonington Railroad bridge.
College	"	north side, about 160 feet west of Prospect street.
Cottage	"	west side, about 160 feet north of Dean street.
Davis	"	south-west corner of Orms street.
Diamond	"	north side, about 220 feet east of Cranston street.
"	"	north side, opposite east line of Susan street.

Diamond street		north-west corner of Superior street.
*Douglas avenue,		east side, opposite north line of Allen street.
* " "		east side, opposite north line of Bernon street.
* " "		north-east corner of Bergen street.
" "		north-east corner of Whipple street.
Doyle	"	north side, about 500 feet east of Camp street.
Ford	street,	south side, about 340 feet east of Crans-ton street.
"	"	south side, about 800 feet east of Crans-ton street.
Hammond	"	west side, about 240 feet south of Division street.
Harkness	"	north-west corner of Meader street.
†Hartford Road,		south side, about 8 feet west of west end of Railroad barn.
Howell	street,	north side, about 380 feet east of Camp street.
Jenckes	"	north-east corner of Pratt street.
Jenkins	"	north-east corner of Graham street.
"	"	north-east corner of Padelford street.
"	"	north-east corner of Knowles street.
John	"	north side, about 160 feet west of Brook street.
"	"	north side, about 250 feet west of Thayer street.
Knight	"	east side, about 80 feet south of Grove street.
"	"	north-east corner of Ring street.
"	"	east side, about half way between Penn street and Tell street.
"	"	south-east corner of Gesler street.
"	"	north-east corner of first alley north of Swiss street.
Messer	"	north-east corner of Oak street.

Messer	street,	north-east corner of Willow street.
"	"	north-east corner of Paine street.
"	"	north side, about 240 feet west of Crans- ton street.
North Main	"	north-west corner of Livingston street.
"	"	west side, opposite south line of Jenkins street.
"	"	west side, opposite north line of Earl's Lane.
Oak	"	north-east corner of Norfolk street.
"	"	north side, about half way between Mes- ser street and Norfolk street.
Ocean	"	north-east corner of Seymour street.
"	"	east side, half way between Potter's avenue and Sayles street.
"	"	east side, half way between Square street and Sayles street.
"	"	south-east corner of Salisbury street.
*Orms	"	south-east corner of Jefferson street.
Penn	"	south side, about half way between Almy street and Courtland street.
"	"	south side, about half way between Courtland street and Knight street.
Pike	"	south-west corner of Benefit street.
Pitman	"	north-east corner of Gano street.
Promenade	"	north side, about 560 feet west of Park street.
State	"	south-west corner of Orms street.
Sheldon	"	north side, opposite west line of Traverse street.
Superior	"	south side, about 190 feet east of Crans- ton street.
"	"	south side, opposite west line of Ware street.
Spruce	"	north-east corner of, and Alley half way between Acorn street and Tefft street.

Spruce	street,	north-east corner of Eutaw street.
"	"	north side, opposite east line of Dean street.
Transit	"	north side, about 168 feet west of Brook street.
"	"	north side, about 143 feet west of Thayer street.
Tobey	"	east side, about half way between Meader street and Broadway.
"	"	east side, about half way between Meader street and High street.
Valley	"	west side, about 240 feet north of Broadway.
"	"	west side, about 140 feet south of School street.
"	"	north-west corner of Delaine street.
"	"	west side, about half way between Helme street, and Grove street.
"	"	west side, about 260 feet north of Helme street, near the Woonasquatucket River.
Wayland	"	east side, about 80 feet north of Manning street.
"	avenue,	south-east corner of Humboldt avenue.
† Webster	"	south side, opposite west line of Hartford Road.
†	"	south-east corner of Winsor street.
†	"	south side, about 42 feet west of Smith street.
West Park	street,	south-east corner of Holden street.
Woodland	"	north side, about 250 feet west of Park street.

The total number of fire hydrants is now six hundred and eighty-nine.

One hydrant has also been set, for use in filling sprinkling carts, etc. The number of such hydrants is now twenty-three,

all of which can be used with a single line of hose for extinguishing fires.

One hundred and seventy Ball & Fitts' Water Meters, made by the Union Water Meter Co., and twenty-two five-eighths-inch Worthington Water Meters, have been put in at the expense of water takers, since the date of the last report. One Ball & Fitts' four-inch Water Meter was set August 9th, at the expense of the city.

There are one thousand and fifty Water Meters now in use, viz:

814 five-eighths inch.
139 three-quarters inch.
55 one inch.
86 one and one-half inch.
5 two inch.
1 four inch.

1,050

The total number of applications for a supply of water is five thousand and thirty-one.

The number of service stops opened during the last quarter is six hundred and seventeen ; six of which are for fire purposes only.

The total number of service stops opened to date is thirty-two hundred and thirty-one.

Seven stops have been closed during the last quarter for non-payment of bills, three of which have been re-opened on payment of bills, and a penalty in each case of two dollars. One stop has been closed to enable the owner to make repairs, there being no stop-cock on the premises, and was re-opened upon payment of two dollars. Of the two stops remaining closed at the commencement of the last quarter for

non-payment, one has been re-opened upon payment of bill and of two dollars penalty. Five stops closed for non-payment remain unopened.

Water is now supplied for the following uses :

4 bakeries; 30 banks; 39 bar-rooms; 1 bath-house; 1 bath-house—Turkish; 82 boarding-houses; 4 bottling establishments; 37 building purposes; 1 car house; 2 carriage-depositories; 1 Christian Union; 13 churches; 1 city barn; 1 city building 1 city bridge, Point street; 5 city drinking fountains; 11 city drinking troughs; 689 city fire hydrants; 9 city fire steamer stations; 1 city hose house; 6 club rooms; 12 coal yards; 1 colored shelter; 1 conservatory of music; 2 convents; 1 court house; 1 decorator; 1 Dexter Asylum; 1437 dwellings of one family; 942 dwellings of two families; 81 dwellings of three families; 88 dwellings of four families; 13 dwellings of five families; 17 dwellings of six families; 4 dwellings of seven families; 3 dwellings of eight families; 2 dye houses; 3 elevators; 1 engraver; 1 express carriage house; 38 fountains—private; 1 fountain—public; 31 fire supplies—private; 1 furrier; 1881 garden and street hydrants; 3 gas-holders; 4 gold and silver platers; 5 gold and silver refiners; 2 grain elevators; 21 green houses; 9 halls; 1 hall of Latter-day Saints; 1 Home for Aged Women; 1 hospital; 14 hotels; 1 infirmary; 3 lodging-houses; 2 lumber dealers. *Manufacturing Establishments*,—2 belt and picker; 3 blank book; 1 Bologna sausage; 1 box; 1 braiding works; 2 brass foundries; 1 brewery; 1 brush; 1 butt; 6 carriage; 2 cement pipe; 1 chain; 5 cigar; 1 cigar box; 4 cloak and dress; 3 confectionery; 1 corset; 3 colorers of jewelry; 7 cotton; 1 crocus; 1 distillery; 3 die-sinkers; 1 dye wood; 1 dyeing, bleaching and calendering company; 1 emery wheel; 1 eyelet; 2 file; 3 furniture; 1 gas; 1 gas burners; 2 gas fixtures; 1 geers; 1 hat; 1 harness; 1 horse shoe; 1 hulled corn; 2 ice cream and soda water; 1 iron company; 1 iron fence; 8 iron foundries; 1 Japan switch; 1 jewelers' cards; 71 jewelry; 3 lapidaries; 16 machinists; 1 mowing machine; 1 nail keg; 2 oil; 1 organ; 2 paper

box; 1 paper collar; 2 paper cop tube; 1 pattern; 3 patent medicine; 1 picture frame; 2 pump; 1 reed; 1 rubber tubing; 4 sash and blinds; 1 screw; 1 sheet iron; 2 shirt; 2 silver ware; 5 soap; 1 spiral spring; 1 starch; 1 steam boiler; 2 steam engines; 1 stencil plate; 1 stove; 1 tanner; 1 tin; 4 tool; 2 top roll; 5 woolen goods; 1 yeast. *Markets*,—26 fish; 66 meat. *Mills*,—1 drug and grain; 2 flour and grain; 4 marble works; 1 paint; 8 planing. 1 music hall; 2 odd fellows' halls; 2 opera houses; 2 orphan asylums; 5 organs; 5 oyster houses; 397 offices; 5 photographers; 5 plaster and stucco workers; 4 plumbers; 5 police stations; 11 printing establishments; 9 provision curers and packers; 7 railroads; 1 reading room; 30 restaurants; 1 roofer. *Saloons*,—4 billiard; 2 bowling; 5 ice cream; 10 lager beer; 6 oyster. *Schools*,—1 boarding; 8 private; 27 public; 1 reform. *Shops*,—17 barber; 5 blacksmith; 6 carpenter; 3 cooper; 1 junk; 6 paint; 1 painter; 4 shoemaker; 19 tailors; 4 tinman. *Stables*,—6 hack; 34 livery; 128 private; 2 sale; 41 work. 12 steamboats; 11 steamships; 5 steam and gas pipe fitters. *Stores*,—1 agricultural implements; 27 apothecary; 1 auction; 3 book; 21 boot and shoe; 1 carpet; 1 carriage trimmings; 10 cigars; 16 clothing; 7 confectionery; 2 drug; 17 dry goods; 72 fancy goods; 7 flour and grain; 11 fruit; 8 furniture; 6 gents' furnishing goods; 73 grocery, retail; 14 grocery, wholesale; 5 hardware; 2 hide and leather; 2 hoop skirts; 10 house furnishing goods; 2 house paper; 3 iron and steel; 9 jewelry; 9 liquor; 1 lime and brick; 2 manufacturers' supplies; 13 millinery; 7 newspaper; 3 paint and oil; 2 paper and paper stock; 6 produce, wholesale; 3 sewing machines; 3 stationery; 2 stove; 3 tea; 2 trunk; 1 umbrella; 1 wool; 2 woolen goods; 15 not classed. 1 store house; 2 undertakers; 1 United States Custom house building; 2 upholsterers; 2 water boats; 1 wheelwright; 1 wood turner; 1 wood yard.

The amount of expenditures during the last
quarter, is \$247,361 82
The total amount of expenditures is, 2,802,876 95.

The total amount of appropriations is,	3,000,000 00
The unexpended balance is,	197,123 05
The amount received during the last quarter,	
all of which has been paid to the city treasurer is,	
For water supplies,	\$15,205 97
For water meters,	6,369 30
For penalties,	10 00
For sundries,	14,716 23
	<hr/>
	86,801 50
The amount received for water in 1872 was,	41,003 51
The amount received for water during the	
first three quarters of 1873 was,	
	79,694 86
The total amount received for water to date is,	120,698 37
The amount of all receipts to date is,	209,416 71

It is not probable than any additional appropriation will be needed during the present quarter.

A bill against Nelson Titus, of \$31.98, for repairs to a fire hydrant broken by him in removing a building, remains unpaid. The Commissioners suggest that the city council should refuse permission to remove any building when the work is to be done by him, unless this bill shall meantime have been paid.

A schedule of bills approved during the last quarter, and of receipts during the same time, and a trial balance of Ledger, September 30, 1873, are hereunto appended and made parts of this report.

A separate report of that portion of the duties of the Water Commissioners which relates to Sewers, is presented herewith

JOSEPH J. COOKE,	} <i>Water</i>
CHAS. E. CARPENTER,	
WILLIAM CORLISS,	

Commissioners.

SCHEDULE OF BILLS APPROVED BY THE WATER COMMISSIONERS, FROM JULY 1, 1873, TO SEPTEMBER 30, 1873.

3205	Samuel M. Gray, paid by him for stone paving on Pawtuxet river bank, - - - - -	\$223 68
3206	Richard Burr, labor at Hope Engine House, - - - - -	14 70
3207	Patrick Burns, " " " " " &c., - - - - -	48 10
3208	Kenneth McKay, building walls of coal vaults, Hope Engine House, - - - - -	417 20
3209	Felix Johnson, labor on gate houses at Sockanosset Reservoir, - - - - -	780 85
3210	Calvin C. Campbell, on account of granite rubble, - - - - -	4,180 00
3211	Samuel M. Gray, paid by him for labor at Pettaconset, - - - - -	5,024 55
3212	" " " " " " - - - - -	330 98
3213	W. A. Burdick, Agent, an account of granite for gate chambers, Hope Reservoir, - - - - -	1,000 00
3214	W. A. Burdick, Agent, granite for gate houses, Sockanosset Reservoir, - - - - -	1,064 50
3215	Alva Carpenter, gate box frames and covers, - - - - -	122 18
3216	George W. Smith, cutting curbstones for hydrant boxes, - - - - -	8 00
3217	Alfred Mundell, use of pump at Pettaconset, - - - - -	15 00
3218	M. D. Copeland, carting pipes and castings, - - - - -	127 97
3219	George W. Lobdell & J. W. & J. J. Newman, excavating for coal vaults at Hope Engine House, - - - - -	529 30
3220	G. B. & W. F. Inman, trenching and back-filling and laying water pipes, - - - - -	6,500 00
3221	G. B. & W. F. Inman, carting pipes, - - - - -	876 69
3222	" " " setting fire hydrants, - - - - -	207 50
3223	" " " laying water pipes, repairing streets, &c., - - - - -	154 38
3224	G. B. & W. F. Inman, labor at Hope Engine House, - - - - -	358 08
3225	Taunton Brick Co., bricks, - - - - -	6,000 00
3226	Steamer Middlesex, freight of water pipes, (charged to Warren Foundry and Machine Co.,) - - - - -	212 34
3227	Lobdell & Newmans, on account of construction of Hope Reservoir, - - - - -	2,325 00
3228	Seth Clarke, cutting stone at Hope Engine House, - - - - -	20 87
3229	Thomas Phillips & Co., on account of laying service pipes, - - - - -	1,500 00
3230	John W. & James J. Newman, contract reservation for laying water pipes, - - - - -	5,000 00
3231	Builders' Iron Foundry, special castings, &c., - - - - -	1,274 51
3232	Dexter Gorton & Co., lumber, carpenters' work, &c., - - - - -	780 15
3233	Fales, Jenks & Sons, on account of gates, hydrants and hydrant boxes, - - - - -	5,000 00
Amount carried forward, - - - - -		\$43,794 40

	Amount brought forward,	-	-	-	\$43,794 40
3234	Stephen Knobb, carting stone for gate chambers, Hope Reservoir,	-	-	-	89 57
3235	Felix Johnson, labor on gate houses at Sockanosset Reservoir,	-	-	-	676 70
3236	Fuller Iron Works, special castings,	-	-	-	2,355 96
3237	Charles H. Parkhurst, counsel fees,	-	-	-	400 00
3238	William Elsbree, setting fire hydrants, &c.,	-	-	-	6 63
3239	H. B. Bowen, pipe bolts, &c.,	-	-	-	167 57
3240	Warren Foundry and Machine Co., on account of water pipes,	-	-	-	39,753 24
3241	Hopkins & Pomroy, coal,	-	-	-	3,100 10
3242	Providence Steam Engine Co., repairs to Worthington Pumping Engine, &c.,	-	-	-	253 14
3243	Kenneth McKay, building walls of coal vaults, Hope Engine House,	-	-	-	468 94
3244	William H. Miller & Co., repairing tools, &c.,	-	-	-	368 63
3245	Charles H. Pierce, salary as assistant engineer,	-	-	-	250 00
3246	Samuel M. Gray, " " " &c.,	-	-	-	335 00
3247	Charles H. Swan, " " " "	-	-	-	166 67
3248	Otis F. Clapp, " " " "	-	-	-	206 33
3249	Howard A. Carson, " " " "	-	-	-	206 33
3250	William T. Schneider, " " " "	-	-	-	100 00
3251	O. Frank Allen, " " " "	-	-	-	125 00
3252	John E. Bowen, " " " "	-	-	-	100 00
3253	Lucius J. Sampson, " " " "	-	-	-	83 33
3254	George H. Slade, " " " "	-	-	-	83 33
3255	Daniel D. Waterman, " " " "	-	-	-	66 67
3256	Charles F. Janes, " service pipe " "	-	-	-	100 00
3257	William F. Janes, " asst. " " "	-	-	-	50 00
3258	Augustus F. Nagle, " mechanical " "	-	-	-	200 00
3259	George F. Munro, " student, engineering department,	-	-	-	41 67
3260	Henry N. Francis, " " " "	-	-	-	41 67
3261	Lepriele Sweet, 2d, " " " "	-	-	-	41 67
3262	Edmund B. Weston, " " " "	-	-	-	41 67
3263	Mark Wilmarth, " " " "	-	-	-	41 67
3264	Louis R. Daniels, " " &c., " "	-	-	-	50 00
3265	Walter R. Jackson, " " " "	-	-	-	33 33
3266	Edwin P. Dawley, " " " "	-	-	-	33 33
3267	Charles M. Hunt, " " " "	-	-	-	25 00
3268	Frank B. Ferris, " " " "	-	-	-	25 00
3269	Thomas L. Botts, " " " "	-	-	-	25 00
3270	William H. Olmstead, " " " "	-	-	-	25 00
3271	William M. Brown, Jr., " " on trial, " "	-	-	-	33 33
3272	Walter F. Slade, salary as service pipe clerk, engineering department,	-	-	-	83 33
3273	Joshua C. Drown, Jr., " clerk engineering department,	-	-	-	75 00
3274	William H. Turner, " " " "	-	-	-	100 00
3275	Daniel C. Stone, salary as temporary office assistant, engineering department,	-	-	-	39 60
	Amount carried forward,	-	-	-	\$94,267 81

	Amount brought forward,	-	-	\$94,267 81
3276	Louis W. Peck, salary as temporary office assistant, engineering department,	-	-	48 00
3277	Andrew B. Purdy, salary as superintendent of pipe work,	-	-	166 67
3278	Elbert Purdy, salary as inspector on pipe line,	-	-	104 00
3279	William H. Patterson, salary as inspector on pipe line,	-	-	104 00
3280	Foster S. Dennis, Jr., " " " "	-	-	104 00
3281	Samuel B. Eccleston, " " of pipes,	-	-	135 00
3282	S. Horace Wheeler, salary as inspector of service pipes,	-	-	104 00
3283	Henry M. Wilcox, salary as assistant inspector of service pipes,	-	-	78 00
3284	Frederic A. Arnold, salary as inspector of water fixtures,	-	-	83 33
3285	Jesse E. Gray, " " at Hope Reservoir,	-	-	140 00
3286	George H. Whitaker, " " " "	-	-	140 00
3287	George H. DeForrest, " time keeper " " "	-	-	63 00
3288	Henry G. Dennis, " superintendent of pipe yard,	-	-	125 00
3289	Richard M. Wood, " clerk at pipe yard,	-	-	66 67
3290	Jeptha Baker, " keeper of Sockanosset Reservoir,	-	-	72 50
3291	George F. Battey, " pumping engineer,	-	-	100 00
3292	John Hamilton, " fireman,	-	-	86 50
3293	George F. Barney, " " "	-	-	67 00
3294	Thomas A. McDonald, " engineer of drainage engine,	-	-	7 50
3295	William H. Thomas, " " " "	-	-	9 00
3296	William F. Tanner, " axeman,	-	-	52 00
3297	Thomas C. Gushue, " commissioner's clerk,	-	-	83 33
3298	Philip S. Chase, " " "	-	-	125 00
3299	Clinton D. Sellow, salary as secretary of water commissioners,	-	-	200 00
3300	George F. Johnson, care of rooms,	-	-	57 24
3301	Charles H. Pierce, paid by him for sundries,	-	-	93 00
3302	" " " " labor at wharf,	-	-	764 00
3303	Samuel M. Gray, horse hire and sundries,	-	-	135 07
3304	Gladding Bros. & Tibbitts, stationery,	-	-	29 76
3305	Knowles, Anthony & Danielson, advertising,	-	-	4 31
3306	Providence Press Co., advertising,	-	-	11 81
3307	John H. Appleton, analysis,	-	-	5 00
3308	William A. McKay, horse-shoeing,	-	-	5 00
3309	Caffrey & Brooks, galvanized iron pipe, &c.,	-	-	9 25
3310	James Crawford, painting and lettering rods,	-	-	10 00
3311	Michael Corrigan, carting sand,	-	-	14 25
3312	Kenneth McKay, labor at Hope Engine House, coal vaults,	-	-	15 20
3313	Providence & New York Steamship Co., freight of roofs for gate houses, Sockanosset Reservoir, (charged to J. B. & J. M. Cornell),	-	-	17 31
3314	John Salisbury, labor, &c., on derrick,	-	-	32 45
3315	B. S. Burrough & Co., oil,	-	-	34 90
3316	Cortiss Steam Engine Co., labor, &c.,	-	-	43 60
3317	W. Congdon & Sons, steel tape, chain, bars, &c.,	-	-	51 01
3318	William S. Briggs, horse hire by engineers,	-	-	75 00
3319	George W. Miller, safe,	-	-	80 00
	Amount carried forward,	-	-	\$98,020 67

	Amount brought forward,	-	-	-	\$96,020 67
3320	Lobdell & Newmans, labor, &c., at Hope Engine House,	-	-	-	131 95
3321	Hammond, Angell & Co., printing,	-	-	-	183 16
3322	M. D. Copeland, teaming,	-	-	-	216 00
3323	Flint Mills, stone gear,	-	-	-	300 00
3324	Felix Johnson, labor on gate houses at Sockanosset Reservoir,	-	-	-	668 79
3325	Hopkins & Pomroy, cement, carting bricks, &c.,	-	-	-	1,811 51
3326	Union Water Meter Co., meters,	-	-	-	3,137 75
3327	Samuel M. Gray, paid by him for labor at Pettacoonset,	-	-	-	245 84
3328	Steamer Middlesex, freight of water pipes, (charged to Warren Foundry and Machine Co.,)	-	-	-	353 98
3329	Samuel M. Gray, paid by him for labor at Pettacoonset,	-	-	-	6,205 04
3330	Charles H. Pierce, " " " Hope Pumping Station, &c.,	-	-	-	94 92
3331	Thomas Phillips & Co., on account of laying service pipes,	-	-	-	2,000 00
3332	Sloop Ida E. Vail, freight of bricks, (charged to S. F. & J. A. Gray,)	-	-	-	130 00
3333	Calvin O. Campbell, on account of granite,	-	-	-	4,101 80
3334	Samuel M. Gray, paid by him for labor at Pettacoonset,	-	-	-	282 75
3335	Lobdell & Newmans, on account of construction of Hope Reservoir,	-	-	-	4,800 00
3336	Steamer Middlesex, freight of water pipes, (charged to Warren Foundry and Machine Co.,)	-	-	-	11 46
3337	Thomas J. Hill, rent of wharf,	-	-	-	500 00
3338	Tuttle & Hobbs, horse keeping, engineering department,	-	-	-	86 37
3339	J. Wheldon & Sons, stone,	-	-	-	1,352 85
3340	Read & Richards, plastering at Hope Engine House,	-	-	-	24 20
3341	Dexter Gorton & Co., carpenters' work, lumber, &c.,	-	-	-	204 28
3342	Leonard & Ellis, oil,	-	-	-	60 63
3343	Michael Tallant, labor at Hope Pumping Station,	-	-	-	73 00
3344	James A. Potter & Co., lumber,	-	-	-	47 61
3345	W. P. Knickerbocker & Co., rope, &c.,	-	-	-	87 34
3346	Lobdell & Newmans, labor at Hope Pumping Station,	-	-	-	127 78
3347	Daniel F. Burlingame, repairing tools, &c.,	-	-	-	84 62
3348	Dexter Gorton & Co., lumber, carpenters' work, &c.,	-	-	-	2,517 13
3349	G. B. & W. F. Inman, trenching and backfilling and for laying water pipes,	-	-	-	7,100 00
3350	G. B. & W. F. Inman, carting pipes,	-	-	-	635 57
3351	" " " setting fire hydrants, repairing streets, &c.,	-	-	-	428 26
3352	George W. Smith, cutting curbstones for hydrant boxes,	-	-	-	32 00
3353	H. B. Bowen, hydrant bolts and pipe bolts,	-	-	-	110 24
3354	Fuller Iron Works, special castings,	-	-	-	1,885 85
3355	Builders' Iron Foundry, " " "	-	-	-	577 07
3356	Hopkins & Pomroy, coal,	-	-	-	1,715 24
3357	Wood & Winsor, machinist's labor, &c.,	-	-	-	112 38
3358	George W. Smith, labor on granite for fountain on Abbott Park, (charged to W. A. Burdick, Agent.)	-	-	-	16 75
3359	M. Golrick, slating, &c., at Hope Engine House,	-	-	-	22 65
3360	Asa K. Lilly, setting foundation for fountain on Abbott Park,	-	-	-	320 00
3361	Michael Corrigan, carting gravel at Hope Pumping Station,	-	-	-	33 00
	Amount carried forward,	-	-	-	\$139,865 44

REPORT OF THE WATER COMMISSIONERS.

25

	Amount brought forward,	-	-	-	\$139,865 44
3362	T. & W. Breck, rent of offices,	-	-	-	750 00
3363	Warren Foundry and Machine Co., water pipes,	-	-	-	16,223 68
3364	Stephen Knobb, carting granite,	-	-	-	6 47
3365	" " " iron beams and granite,	-	-	-	40 64
3366	Michael Corrigan, carting sand and gravel,	-	-	-	70 50
3367	Hopkins & Pomroy, cement, carting bricks, &c.,	-	-	-	2,987 36
3368	Providence & New York Steamship Co., freight of cement, &c.,	-	-	-	26 91
3369	William H. Miller & Co., tools, repairing tools, &c.,	-	-	-	303 79
3370	Clyde Iron line of Steamships, freight of iron beams, (charged to Phenix Iron Co.,)	-	-	-	33 04
3371	George H. Burnham, commission and expenses selling house on Olney street,	-	-	-	21 48
3372	W. A. Burdick, Agent, on account of granite,	-	-	-	2,000 00
3373	Steamer Middlesex, freight of water pipes, (charged to War- ren Foundry and Machine Co.,)	-	-	-	510 96
3374	Charles H. Pierce, salary as assistant engineer,	-	-	-	250 00
3375	Samuel M. Gray, " " " &c.,	-	-	-	335 00
3376	Charles H. Swan, " " " "	-	-	-	166 67
3377	Otis F. Clapp, " " " "	-	-	-	208 33
3378	Howard A. Carson, " " " "	-	-	-	208 33
3379	William T. Schneider, " " " "	-	-	-	100 00
3380	O. Frank Allen, " " " "	-	-	-	125 00
3381	John E. Bowen, " " " "	-	-	-	100 00
3382	Lucius J. Sampson, " " " "	-	-	-	83 33
3383	George H. Slade, " " " "	-	-	-	83 33
3384	Daniel D. Waterman, " " " "	-	-	-	66 67
3385	Charles F. Jones, " service pipe " "	-	-	-	100 00
3386	William F. Jones, " asst. " " "	-	-	-	66 67
3387	Augustus F. Nagle, " mechanical " "	-	-	-	200 00
3388	George F. Monro, " student, engineering department,	-	-	-	41 67
3389	Henry N. Francis, " " " "	-	-	-	41 67
3390	Leprillete Sweet, 2d, " " " "	-	-	-	41 67
3391	Edmund B. Weston, " " " "	-	-	-	41 67
3392	Mark Wilmarth, " " " "	-	-	-	41 67
3393	Louis R. Daniels, " " &c., " "	-	-	-	50 00
3394	Walter R. Jackson, " " " "	-	-	-	33 33
3395	Edwin P. Dawley, " " " "	-	-	-	33 33
3396	Charles M. Hunt, " " " "	-	-	-	25 00
3397	Frank B. Ferris, salary as student, engineering department,	-	-	-	25 00
3398	Thomas L. Botts, " " " "	-	-	-	25 00
3399	William H. Olmstead, " " " "	-	-	-	25 00
3400	William M. Brown, Jr., " on trial, " "	-	-	-	33 33
3401	Walter F. Slade, salary as service pipe clerk, engineering department,	-	-	-	83 33
3402	Joshua C. Drown, Jr., salary as clerk, engineering department,	-	-	-	75 00
3403	William H. Turner, " " " "	-	-	-	100 00
3404	Daniel C. Stone, salary as temporary office assistant, engi- neering department,	-	-	-	46 00
	Amount carried forward,	-	-	-	\$165,696 27

	Amount brought forward,	-	-	- \$165,696 27
3405	Louis W. Peck, salary as temporary office assistant, engineering department,	-	-	9 00
3406	Charles E. Shedd, salary as temporary assistant, engineering department,	-	-	25 00
3407	Andrew B. Purdy, salary as superintendent of pipe work,	-	-	166 67
3408	Elbert Purdy, " inspector on pipe line,	-	-	104 00
3409	William H. Patterson, " " " " "	-	-	104 00
3410	Foster S. Dennis, Jr., " " " " "	-	-	104 00
3411	Samuel R. Eccleston, " " of pipes,	-	-	130 00
3412	S. Horace Wheeler, " " of service pipes,	-	-	125 00
3413	Henry M. Wilcox, " assistant inspector of service pipes,	-	-	85 00
3414	Frederic A. Arnold, salary as inspector of water fixtures,	-	-	83 33
3415	Henry G. Dennis, " superintendent of pipe yard,	-	-	125 00
3416	Richard M. Wood, " clerk at pipe yard,	-	-	66 67
3417	Jeptha Baker, " keeper of Sockanosset Reservoir,	-	-	80 00
3418	George F. Battey, " pumping engineer,	-	-	100 00
3419	John Hamilton, " fireman,	-	-	75 00
3420	George F. Barney, " " " " "	-	-	60 00
3421	Jesse E. Gray, " inspector at Hope Reservoir,	-	-	75 48
3422	George H. Whitaker, " " " " " "	-	-	130 00
3423	George H. DeForrest, " time keeper, &c., at Hope Reservoir,	-	-	81 00
3424	William F. Tanner, salary as axeman,	-	-	56 40
3425	Thomas C. Gushee, " commissioner's clerk,	-	-	83 33
3426	Philip S. Chase, " " " " "	-	-	125 00
3427	Clinton D. Sellow, " secretary of water commissioners,	-	-	200 00
3428	George F. Johnson, care of rooms,	-	-	55 69
3429	Charles H. Pierce, paid by him for labor at wharf,	-	-	765 25
3430	Charles H. Pierce, paid by him for labor at Hope Pumping Station,	-	-	42 75
3431	Charles H. Pierce, paid by him for sundries,	-	-	80 76
3432	Samuel M. Gray, horse hire, &c.,	-	-	112 25
3433	Wm. S. Briggs, horse hire, by engineers,	-	-	75 00
3434	Providence & Newport Lead Works, lead,	-	-	42 68
3435	B. F. Almy, cotton waste,	-	-	12 00
3436	M. D. Copeland, teaming,	-	-	234 00
3437	Phenix Iron Company, iron beams for roof of Hope Engine House coal vaults,	-	-	1,855 16
3438	John Mason, labor on models, patterns, &c.,	-	-	100 05
3439	Henry T. Root, dusters and brush,	-	-	8 75
3440	Union Water Meter Co., water meters,	-	-	1,936 92
3441	O. F. Garvey, wrenches,	-	-	12 00
3442	Boston Machine Co., post hydrants,	-	-	180 00
3443	Stone & Carpenter, architectural services,	-	-	500 00
3444	O. F. Gorham, wheelbarrow, &c.,	-	-	14 90
3445	Providence Steam Engine Co., labor of machinist,	-	-	5 00
3446	F. W. Lincoln, Jr. & Co., engineer's transit,	-	-	250 00
	Amount carried forward,	-	-	- \$174,173 22

	Amount brought forward,	-	-	-	\$174,173 22
3447	B. S. Burrough & Co., oil, -	-	-	-	34 20
3448	Kenneth McKay, labor on Hope Engine House, coal vaults, -	-	-	-	15 20
3449	Corliss Steam Engine Co., services of engineer, -	-	-	-	102 60
3450	F. O. Norton, cement, -	-	-	-	175 00
3451	Walter Coleman & Sons, materials for derrick, -	-	-	-	54 64
3452	Blackstone Iron Works, grate bars, -	-	-	-	143 70
3453	Charles E. Hall, carting sand at Hope Engine House, -	-	-	-	86 46
3454	Dexter Gorton & Co, gate boxes, &c., -	-	-	-	126 08
3455	Barker, Whitaker & Co., tools, rubber hose, metallic packing, &c., -	-	-	-	290 79
3456	W. A. Burdick, Agent, stone for fountain on Abbott Park, &c., -	-	-	-	396 25
3457	William Aplin, services as clerk, engineering department, -	-	-	-	83 33
3458	Calvin C. Campbell, on account of granite, -	-	-	-	5,484 00
3459	Thomas Phillips & Co., on account of service pipe, -	-	-	-	1,800 00
3460	John W. Mathewson & Co., on account of granite, -	-	-	-	2,150 00
3461	Samuel M. Gray, paid by him for labor at Pettaconset, -	-	-	-	7,594 28
3462	Lobdell & Newmans, on account of construction of Hope Reservoir, -	-	-	-	5,850 00
3463	G. B. & W. F. Inman, trenching and backfilling and laying water pipes, -	-	-	-	5,100 00
3464	William A. Eddy, wood for Pettaconset pumping station, -	-	-	-	35 00
3465	George W. Smith, cutting curbstones for hydrant boxes, -	-	-	-	14 00
3466	Charles H. Pierce, paid by him for labor at Hope Pumping Station, -	-	-	-	275 80
3467	Daniel F. Burlingame, repairs to tools, &c., -	-	-	-	157 91
3468	Dexter Gorton & Co., carpenters' work, lumber, &c., -	-	-	-	1,390 11
3469	Sloop Ida E. Vail, freight of bricks, (charged to S. F. & J. A. Gray,) -	-	-	-	131 63
3470	G. B. & W. F. Inman, carting pipes, -	-	-	-	476 18
3471	" " " setting fire hydrants, laying water pipes, &c., -	-	-	-	345 12
3472	John B. Jervis, professional services in relation to Hope Reservoir, -	-	-	-	287 68
3473	James B. Francis, professional services in relation to Hope Reservoir, -	-	-	-	119 40
3474	S. F. & J. A. Gray, on account of bricks, -	-	-	-	2,500 00
3475	Builders' Iron Foundry, special castings and valve covers, -	-	-	-	1,041 53
3476	Fuller Iron Works, " " " boxes, -	-	-	-	2,071 58
3477	Thomas Phillips & Co., on account for laying service pipes, -	-	-	-	1,000 00
3478	Thomas Phillips & Co., on account for repairs and extra work, -	-	-	-	600 00
3479	S. R. Eccleston, expenses to Phillipsburg and return, &c., -	-	-	-	23 12
3480	Henry D. Griswold, powder and fuse, -	-	-	-	5 25
3481	Bugbee & Hall, stationery, -	-	-	-	11 00
3482	Lobdell & Newmans, labor, &c., furnished by them, -	-	-	-	283 58
3483	Warren Foundry and Machine Co., water pipes, -	-	-	-	13,778 18
3484	Nathaniel Pearce & Son, iron wedges, &c., -	-	-	-	57 40
3485	William M. Holloway, labor at Pettaconset, -	-	-	-	77 15
3486	W. P. Knickerbocker & Co., rope, &c., -	-	-	-	75 37
	Amount carried forward,	-	-	-	\$228,416 74

	Amount brought forward,	-	-	-	\$223,416 74
3487	John A. Moore, carting wood, &c.,	-	-	-	21 16
3488	William Elsbree, repairing streets, (charged to Thomas Phillips & Co.,)	-	-	-	91 87
3489	Charles H. Pierce, paid by him for labor at Hope Engine House,	-	-	-	155 80
3490	Thomas Phillips & Co., laying service pipes,	-	-	-	502 24
3491	Rhode Island Concrete Co., on account for concreting around hydrants,	-	-	-	200 00
3492	J. B. Angell, repairing, tools, &c.,	-	-	-	9 06
3493	Samuel M. Gray, on account for paying masons, laborers, &c., at Pettaconset,	-	-	-	2,000 00
3494	J. B. & J. M. Cornell, iron work for Hope Engine House, roofs, &c.,	-	-	-	5,400 18
3495	James Carroll, carting sand and gravel, &c.,	-	-	-	113 13
3496	J. Herbert Shedd, salary as chief engineer,	-	-	-	2,000 00
3497	Charles H. Pierce, " assistant engineer,	-	-	-	250 00
3498	Samuel M. Gray, " " " &c.,	-	-	-	335 00
3499	Charles H. Swan, " " " "	-	-	-	166 67
3500	Otis F. Clapp, " " " "	-	-	-	208 33
3501	Howard A. Carson, " " " "	-	-	-	208 33
3502	William T. Schneider, " " " "	-	-	-	100 00
3503	C. Frank Allen, " " " "	-	-	-	125 00
3504	John E. Bowen, " " " "	-	-	-	100 00
3505	Lucius J. Sampson, " " " "	-	-	-	83 33
3506	George H. Slade, " " " "	-	-	-	83 33
3507	Daniel D. Waterman, " " " "	-	-	-	66 67
3508	Charles F. Janes, " service pipe engineer,	-	-	-	100 00
3509	William F. Janes, " asst. " " "	-	-	-	66 67
3510	Augustus F. Nagle, " mechanical " "	-	-	-	200 00
3511	George F. Munro, " as student, engineering department,	-	-	-	41 67
3512	Henry N. Francis, " " " "	-	-	-	41 67
3513	Leprilte Sweet, 2d, " " " "	-	-	-	41 67
3514	Edmund B. Weston, " " " "	-	-	-	41 67
3515	Louis R. Daniels, " " &c., " "	-	-	-	50 00
3516	Walter R. Jackson, salary as student, engineering department,	-	-	-	33 33
3517	Edwin P. Dawley, salary as student, engineering department,	-	-	-	33 33
3518	Charles M. Hunt, " " " "	-	-	-	25 00
3519	Frank B. Ferris, " " " "	-	-	-	25 00
3520	Thomas L. Botts, " " " "	-	-	-	25 00
3521	William H. Olmstead, " " &c., " "	-	-	-	29 95
3522	William M. Brown, Jr., " " " "	-	-	-	33 33
3523	Joshua O. Drown, Jr., " Clerk, " "	-	-	-	75 00
3524	Walter F. Slade, " service pipe clerk, engineering department,	-	-	-	83 33
3525	William H. Turner, salary as clerk, engineering department,	-	-	-	100 00
3526	William Alpin, " " &c., " "	-	-	-	83 33
3527	Daniel C. Stone, " temporary office assistant, engineering department,	-	-	-	19 40
	Amount carried forward,	-	-	-	\$241,785 89

	Amount brought forward,	-	-	-	\$241,785 89
3528	Louis W. Peck, salary as temporary office assistant, engineering department,	-	-	-	43 00
3529	Andrew B. Purdy, salary as superintendent of pipe work,	-	-	-	166 67
3530	Elbert Purdy, " inspector on pipe line,	-	-	-	104 00
3531	William H. Patterson, " " "	-	-	-	104 00
3532	Foster S. Dennis, Jr., " " "	-	-	-	104 00
3533	Samuel R. Eccleston, " " "	-	-	-	104 00
3534	S. Horace Wheeler, " " of service pipes,	-	-	-	125 00
3535	Henry M. Wilcox, " assistant inspector of service pipes,	-	-	-	85 00
3536	Frederic A. Arnold, " inspector of water fixtures,	-	-	-	83 33
3537	Henry G. Dennis, " superintendent of pipe yard,	-	-	-	125 00
3538	Richard M. Wood, " clerk at pipe yard,	-	-	-	66 67
3539	Jephtha Baker, " keeper of Sockanosset Reservoir,	-	-	-	77 50
3540	George F. Battey, " pumping engineer,	-	-	-	100 00
3541	John Hamilton, " fireman,	-	-	-	80 00
3542	George F. Barney, " " "	-	-	-	60 00
3543	George H. Whitaker, " inspector at Hope Reservoir,	-	-	-	130 00
3544	Burrows Chace, " " " "	-	-	-	145 00
3545	Alexis C. Miller, " " " "	-	-	-	31 50
3546	George H. DeForrest, " time keeper at Hope Reservoir,	-	-	-	81 00
3547	William F. Tanner, " axeman,	-	-	-	52 00
3548	Leonard N. Austin, Jr., " commissioners' clerk,	-	-	-	85 58
3549	Thomas C. Gushee, " " " "	-	-	-	83 33
3550	Philip S. Chase, " " " "	-	-	-	125 00
3551	Clinton D. Sellow, " secretary of water commissioners,	-	-	-	200 00
3552	Joseph J. Cooke, " water commissioner,	-	-	-	500 00
3553	Charles E. Carpenter, " " " "	-	-	-	500 00
3554	William Corliss, " " " "	-	-	-	500 00
3555	George F. Johnson, care of rooms,	-	-	-	56 20
3556	Charles H. Pierce, paid by him for labor at wharf,	-	-	-	660 25
3557	" " " " " Hope Engine House,	-	-	-	177 60
3558	Charles H. Pierce, paid by him for sundries,	-	-	-	88 03
3559	Samuel M. Gray, horse hire, &c.,	-	-	-	120 09
3560	William S. Briggs, horse hire by engineers,	-	-	-	141 00
3561	Tuttle & Hobbs, horse keeping, &c., engineering department,	-	-	-	172 64
3562	M. D. Copeland, teaming,	-	-	-	238 50
3563	Stephen Knobb, carting stone, &c.,	-	-	-	67 25
3564	Knowles, Anthony & Danielson, advertising,	-	-	-	8 44
3565	George F. Shedd, plumb bobs,	-	-	-	10 50
3566	Darling, Brown & Sharpe, repairing calipers,	-	-	-	11 60
3567	G. W. Edmunds, repairing wagon,	-	-	-	12 27

\$247,361 82

RECEIVED FROM JULY 1, 1873, TO SEPTEMBER 30, 1873, INCLUSIVE, AND PAID TO THE CITY TREASURER.

1873.		
July	1. Of Walter Richmond, for labor and materials, .	\$13 58
	5. Of John Godfrey, for three months rent of farm in Warwick, purchased of Miss Patience W. Chace, to October 8, 1873, .	43 75
	7. Of Stafford & Co., for six months rent of Pawtuxet Mill, to July 1, 1873, .	400 00
	12. Of Gideon G. Hicks, for labor and materials, .	126 85
	12. Of Peleg P. Cranston, for three months rent of "Randall estate," so called in Pawtuxet, to July 1, 1873, .	50 00
	15. Of Atlantic DeLaine Co., for labor and materials, .	5,351 08
	16. Of Samuel M. Gray, for sundries, .	88 55
	16. Of City of Providence, for sewer expenses, .	596 50
	21. Of Fuller Iron Works, for old iron, .	248 15
	22. Of American Screw Co., for labor and materials, .	635 78
	23. Of Franklin Foundry and Machine Co., for labor and materials, .	374 19
	23. Of Providence Tool Co., for labor and materials, .	121 38
	23. Of George H. Corliss, for materials, .	18 99
	26. Of James Smith, " " .	21 95
August	4. Of Providence Gas Co., for building on their wharf, .	300 00
	4. Of Henry G. Dennis, for wharfage collected by him, .	5 65
	7. Of Samuel M. Gray, for sundries, .	47 10
	9. Of City of Providence, for sewer expenses, .	4,093 00
	12. Of Samuel R. Eccleston, for inspection of pipes, .	15 00
	25. Of Day & Chapin, for labor and materials, .	261 73
September 3.	26. Of City of Providence, for sewer expenses, .	340 57
	Of Phineas Conley, for grass and pasturage on farm purchased of S. B. Gardiner, .	50 00
	5. Of F. H. & C. K. Richmond, for labor and materials, .	52 54
	9. Of People's Steamboat Co., " " .	225 14
	10. Of William A. Harris, " " .	158 40
	15. Of Samuel M. Gray, for sundries, .	4 50
	16. Of William M. Holloway, for three months rent of farm in Warwick, purchased of Richard U. Rhodes and wife, to December 1, 1873, .	56 25
	25. Of Fuller Iron Works, for old iron, .	542 32
	25. " " " " labor and materials, .	142 05
	26. Of Benjamin F. Almy, " " " " .	266 03
	27. Of Peleg P. Cranston, for three months rent of "Randall estate," so called, in Pawtuxet, to October 1, 1873, .	50 00
	30. Of Kenneth McKay, for error in payment of bill, .	15 20
	30. For water during the present quarter, .	15,205 97
	30. For meters " " " " .	6,369 30
	30. For penalties " " " " .	10 00
		<hr/>
		\$36,301 50

TRIAL BALANCE OF LEDGER, SEPTEMBER 30, 1873.

	Dr.	
Hope Reservoir for land,		\$124,122 80
" " " sundries,		322 86
" " " labor,		279 88
" " " gate chambers,		171 74
" " " drain,		178 58
" " " inspection,		1,246 98
" Engine House,		53,873 66
Sockanosset Reservoir for construction,		177,870 72
" " " sundries,		3,119 06
" " " land,		16,074 85
" " " watch,		1,594 25
" " " gate houses,		17,837 06
" " " drain,		1,750 95
" " " inspection,		6,819 18
" " " extra work and materials,		189 70
" " " gate chambers,		19,299 97
Line of leading mains for labor and materials,		19,806 53
" " " extra trenching, etc.,		305 95
" " " land and damages,		1,665 00
Force main line for land and damages,		3,006 35
" " " labor and materials,		5,099 28
" " " extra trenching, etc.,		322 56
Office furniture, stoves, gas fixtures, etc.,		1,212 81
Rent of offices,		2,950 00
Books, stationery, etc.,		744 14
Fuel and lights,		223 26
Horse-hire by commissioners,		19 00
Janitor of rooms,		507 00
Travelling expenses of commissioners,		122 62
Clerks' salaries,		4,984 51
Commissioners' salaries,		24,208 79
Secretary's salary,		2,766 71
Sundries,		348 54
Printing,		1 711 25
Advertising,		1,545 50
Fences,		2,050 88
Stop valves,		47,190 70
Store house and work shop,		1,207 88
Tools,		7,441 32
Labor on pipes,		13,637 76
Rent of wharves and pipe yards,		3,953 39
Cast iron water pipes,		1,025,635 99
Linking curved pipes,		323 75
Special castings,		77,140 99
Lumber,		1,455 71
Fire hydrants,		68,755 66
Sockanosset hill cross road,		2,855 88
Pettaconset and Sockanosset telegraph line,		1,724 28
Dwelling houses at Pettaconset,		4,251 33
Culverts and bridge on line of force mains,		6,775 33
Amount carried forward,		\$1,760,617 62

Amount brought forward,	\$1,760,617 62
Culverts at Pettaconset,	3,557 92
Real estate in Warwick,	13,118 04
Water privileges, mill and other real estate in Pawtuxet,	50,231 96
Pochasset bridge,	5,559 83
Wharf salaries,	5,774 43
Temporary engine house at Pettaconset,	8,671 46
Engine house at Pettaconset,	38,290 41
Natural Filter Basin,	32,620 65
Roads, slopes, etc., at Pettaconset,	10,565 70
Removing loam,	462 95
Iron screw piles,	3,766 46
Hydrant bolts,	1,320 16
Pipe bolts,	1,408 68
Photographs,	149 00
Hydrant heads,	6,603 84
Taps and stops,	13,547 06
Valve covers,	7,013 26
Service pipe,	25,178 49
Hydrant boxes,	13,381 10
Setting fire hydrants,	8,635 69
Valve boxes,	24,008 66
Check valves,	1,412 43
Air cocks, boxes, covers and setting,	500 05
Night and Sunday Watch at engine house,	1,154 00
Pettaconset pumping station for land,	1,621 24
" " " " sundries,	3,563 17
" " " " engineer,	2,898 23
" " " " coal and wood,	13,766 13
" " " " labor on fuel,	964 01
" " " " firemen,	2,664 40
Setting blow-offs,	265 66
Ascertaining and removing nuisances on Pawtuxet river,	479 46
S. F. & J. A. Gray,	4,949 13
Rhode Island Concrete Co.,	150 00
Freeborn Johnson & Co.,	3,500 00
Taunton Brick Co.,	3,444 19
W. A. Burdick, Agent,	3,031 32
Fales, Jenks & Sons,	4,250 00
Phoenix Iron Co.,	2 96
G. B. & W. F. Inman,	35,300 00
Lobdell & Newmans,	17,925 00
John W. Mathewson & Co.,	2,150 00
Granite Railway Co.,	13,156 23
S. A. Hammond,	15 00
Town of Cranston,	5,000 00
A. & W. Sprague Manufacturing Co.,	2,500 00
Thomas Phillips & Co.,	3,493 07
City of Providence, Fountain, Abbott Park,	702 07
Read & Richards,	3,082 40
Calvin C. Campbell,	17,310 80
Nelson Titus,	31 98
Providence Tool Co.,	241 34
Samuel M. Gray,	2,000 00
City Treasurer,	88,718 34
" " for water payments,	120,698 37
Amount carried forward,	\$3,414,993 44

REPORT OF THE WATER COMMISSIONERS.

33

Amount brought forward,	\$3,414,898 44
Testing pipe iron,	443 50
Iron drain pipes and gate,	284 21
Carting pipes,	28,416 59
Counsel fees,	4,200 00
Inspection of pipes,	7,626 76
Inspection of pipe laying,	19,979 55
Inspection of water fixtures,	1,582 08
Testing bolts and composition castings,	84 25
Laying water pipes,	268,101 22
" service pipes,	18,339 63
" suction pipe, etc.,	85 00
Drainage pump and engine,	2,066 49
Hydrants for street sprinklers,	1,653 28
Boston hydrants,	7 46
Temporary boarding house at Pettaconset,	1,137 43
Public drinking fountains and troughs,	55 60
Water meters,	30,810 80
Worthington pumping engine,	37,346 36
	<hr/>
	\$3,837,293 65

ENGINEERING DEPARTMENT—

For Instruments,	2,602 17
Tools,	653 12
Furniture, stoves, gas fixtures, etc.,	2,449 68
Books, stationery, etc.,	2,272 52
Draughting,	3,523 52
Labor,	4,362 83
Horse and wagon account,	1,307 72
Horse keeping, shoeing, etc.,	1,322 95
Horse hire,	2,838 90
Rent of offices,	5,290 61
Fuel and lights,	580 65
Janitor of rooms,	1,001 38
Experimental filter,	91 06
Sundries,	2,115 71
Test wells,	1,579 40
Consultations,	837 06
Office building at Pettaconset,	553 21
" " " Sockanosset reservoir,	563 22
Stakes and strips,	695 62
Printing,	265 88
Maps,	86 67
Service pipe experiments,	295 76
Temporary assistance,	6,795 72
Salaries,	103,062 02
	<hr/>
	145,127 67
Amount carried forward,	<hr/>
	\$3,982,421 22

Amount brought forward,		\$2,962,421 22
Ca.		
Hope reservoir for land, (rents received and buildings, etc., sold,)	5,868 28	
Sockanosset reservoir for land, (rents received and wood, etc., sold,)	1,494 49	
Real estate in Warwick, (rents received,)	881 25	
Pettiscocket pumping station for land, (rents received,)	452 29	
Water privileges, mill and other real estate in Pawtuxet, (rents received,)	2,889 58	
J. B. & J. M. Cornell,	1,000 00	
Warren Foundry and Machine Co.,	15,175 00	
Interest,	54 06	
Water meters,	20,991 40	
Penalties,	74 00	
Water,	120,596 87	
Approved bills,	2,802,876 95	\$2,962,421 22

1873-74.

CITY DOCUMENT. •

No. 41.

SEVENTEENTH QUARTERLY REPORT
OF THE
WATER COMMISSIONERS
OF THE
CITY OF PROVIDENCE,

JANUARY 1, 1874.



PROVIDENCE:
HAMMOND, ANGELL & CO., PRINTERS TO THE CITY.
1874.



1873-74.

CITY DOCUMENT.

No. 41.

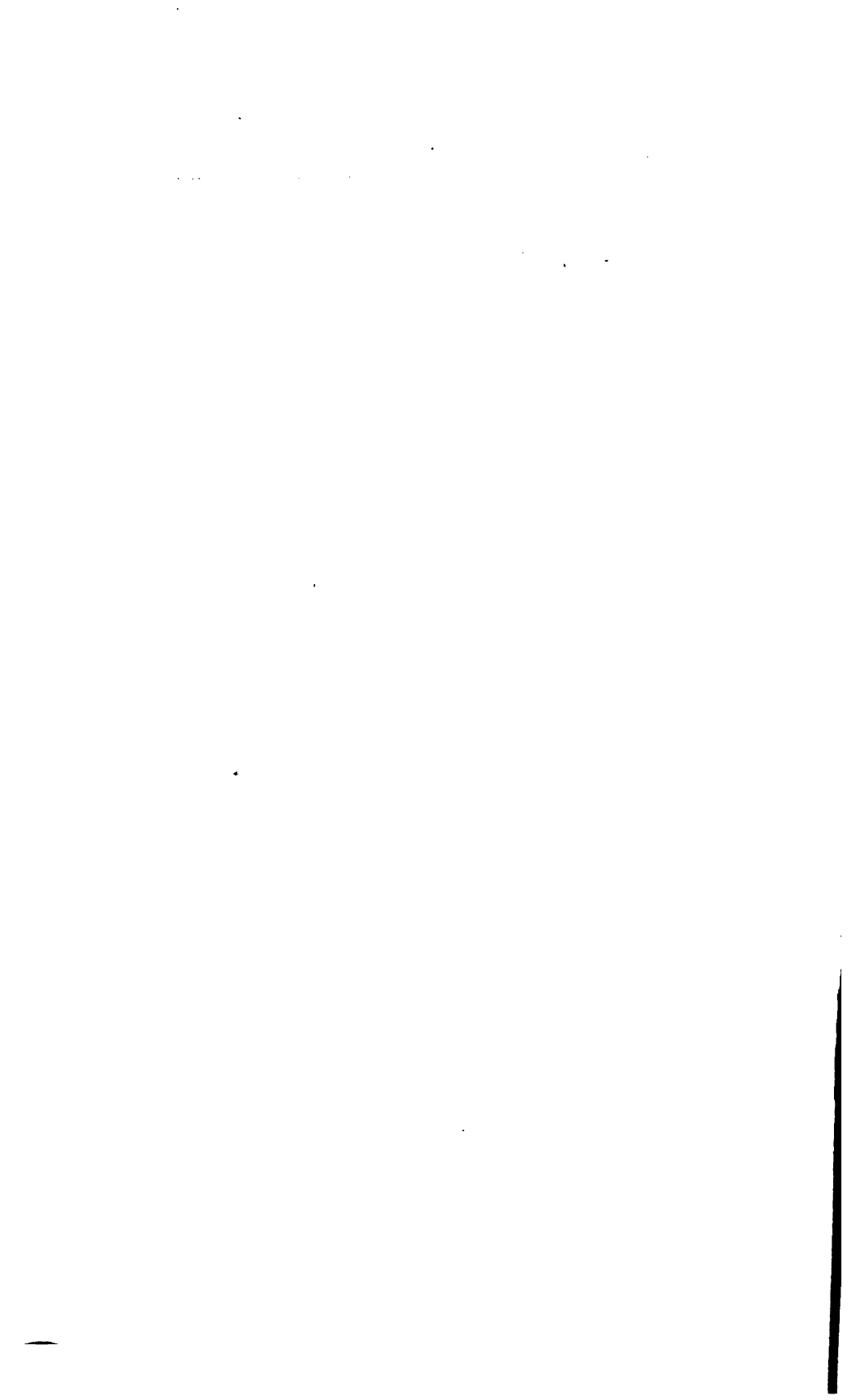
SEVENTEENTH QUARTERLY REPORT
OF THE
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OF THE
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1874.



ORGANIZATION
OF THE
PROVIDENCE WATER WORKS.

WATER COMMISSIONERS.

JOSEPH J. COOKE, PRESIDENT.
CHARLES E. CARPENTER,
WILLIAM CORLISS.

SECRETARY OF THE WATER COMMISSIONERS.

CLINTON D. SELLEW.

Office No. 35 North Main street.

CHIEF ENGINEER.

J. HERBERT SHEDD.

Office No. 35 North Main street.



REPORT.

OFFICE OF THE WATER COMMISSIONERS, }
PROVIDENCE, January 1st, 1874. }

TO THE HONORABLE THE CITY COUNCIL :

The undersigned, Water Commissioners, respectfully present their Seventeenth Quarterly Report :

George F. Munro, who had been three years a student in the engineering department, has been appointed an Assistant Engineer, with a salary of one thousand dollars per annum, dating from October 17, 1873.

On the third day of November, an advertisement was published, inviting proposals for the construction of a Cornish engine, and the erection of the same at Pettaconset. The proposals which were received were opened on the ninth day of December, and were all rejected. The prices named were unsatisfactory.

On the twelfth day of December, an advertisement was published, inviting proposals for furnishing 875 tons of 2,240 pounds, 36 inch, cast iron pipes. The proposals which were received were opened on the nineteenth day of the same month, and were all rejected, the prices named being unsatisfactory. These pipes are wanted for a second line of force-mains.

The engine erected at Hope Pumping Station, by George H. Corliss, under the contract executed with him, February 8, 1872, commenced pumping water into the High Service on the fourth day of October, and has since pumped continuously,

excepting on three occasions at night, when the engine was stopped for a few hours for alterations or repairs.

The parties to the contract having been unable to agree upon three persons to compose the committee to make the test therein required, the Commissioners chose Frederic Graff, of Philadelphia, formerly Chief Engineer of the Philadelphia Water Works, as one member of said committee, and Mr. Corliss chose George Huntington Reynolds, of New York, as another member. The two members so chosen have appointed Erastus W. Smith, of New York, as the third member, thus completing the committee. The committee have designated the fifth day of January, instant, for the commencement of the trial.

The engine at Pettaconset was stopped for repairs November 19th, and re-commenced pumping December 10th. During this time, the reservoir, which was full at the beginning, was drawn upon to the extent of about three-quarters of the supply in store. After filling the reservoir, the engine was again stopped, 26th ultimo, for the completion of repairs. It is expected that in two days it will be again in motion. Water in the reservoir at 7 o'clock this morning was 178.45 feet above high tide, the reservoir being 2.05 feet less than full.

The average daily consumption of water during the last quarter, has been about 1,713,400 gallons.

Work on the engine house at Pettaconset, suspended September 24th, was resumed November 1st.

Fair progress has been made in the construction of Hope Reservoir.

Three iron drinking fountains, for man and beast, have been set, viz: one in Wickenden street; one in India street, and one in Dexter street.

The following communication was received, 30th December, ultimo.

"COUNCIL CLERK'S OFFICE,
CRANSTON, Dec. 29th, 1873. }

TO JOSEPH J. COOKE, ESQ., PRESIDENT OF BOARD OF
WATER COMMISSIONERS :

DEAR SIR:—I am instructed by the Town Council of the town of Cranston, to inform the Water Commissioners of the City of Providence, that whenever the City of Providence shall convey to the town of Cranston, (for highway purposes,) the land over which the highway, called Reservoir avenue, passes, being the same conveyed to said city by the heirs of Joseph Harris, deceased, the said clerk is ordered and directed to draw an order on the town treasurer in favor of the City of Providence, for the sum of five thousand (\$5,000) dollars.

Respectfully Yours,

J. M. WHEELER,

Council Clerk."

The following resolution, passed by the Town Council, September 24, 1870; together with a resolution passed October 12, 1870, releasing the city from its obligation to keep the new portion of Sockanosset hill cross-road in repair; constitute, in effect, the agreement under which the Commissioners acted in grading the avenue in the town of Cranston in which the water mains, leading from Sockanosset Reservoir, have been laid :

"RESOLVED, That, if the Water Commissioners of the city of Providence will grade the road, formerly the Providence and Pawcatuck Turnpike, fifty feet in width on the tread from the city line to the point where the line of their leading mains leaves the said road, and from thence make a road of the same width to the Sockanosset Hill Cross Road, building an iron bridge forty feet in width over the Pocasset river, this Council will provide for any land damages which may ensue by reason of the grading and laying out of said road as far south as the southerly line of A. & W. Sprague's land and no farther, and will establish the new road as a public highway when com-

pleted, and will also pay to said Commissioners the sum of five thousand (\$5,000) dollars, provided an additional sum of twenty-five hundred (\$2,500) dollars be contributed by Col. Amasa Sprague, the same to be paid to said Commissioners toward grading said road."

Appended to a certified copy of the above resolution, is the following:

"We hereby agree to pay to the Water Commissioners of the City of Providence, the sum of twenty-five hundred (\$2,500) dollars, to aid in grading and improving the road, formerly the Providence and Pawcatuck Turnpike, when said road is completed.

A. & W. SPRAGUE MFG. CO.,
By AMASA SPRAGUE, TR."

The deed from the heirs of Joseph Harris, to the city, of the strip of land referred to, conveys it "subject to use, as a public highway, of the town of Cranston."

The Commissioners recommend that the City Treasurer be instructed to give to the town of Cranston such a deed of the said strip as may be approved by the City Solicitor.

The A. & W. Sprague Mfg. Co., has not paid the aforesaid sum of twenty-five hundred dollars.

The "Schedule of Water Rates" has been amended in regard to "Fountains" and "Garden Hydrants and Street and Window Washers;" while no change has been made in the rate, the prices for different sizes of fountain jets are shown more plainly. The right to use "garden hydrants and street and window washers" is limited to one hour per day, unless an additional sum is paid for longer use, while the restriction in regard to the portion of the day in which water may be used for sprinkling streets, is removed. The statement is made that "when water passes through a meter, it may be used for any and all purposes."

Plumbers' licenses have been issued as follows:

REPORT OF THE WATER COMMISSIONERS.

9

Gorham Manufacturing Company, Rollin M. Harris,
Maturin R. Capron.

The number of Plumbers' licenses issued to date is forty.

The following statement shows the length of pipes laid during the last quarter; the size of the pipes; where laid, and the totals since the commencement of the work:

30 INCH.

In Thayer street, and Hope Reservoir land,	2,281 feet.
Including 3 cut pipes, 1 branch, 2 curved pipes, 1 gate and 1 sleeve,	
Previously,	40,842 feet.
Total,	43,123 feet.

24 INCH.

In Olney and Thayer streets,	1,619 feet.
Including 5 cut pipes, 2 branches, 6 curved pipes, 2 gates, and 1 sleeve.	
Previously,	18,815 feet.
Total,	20,434 feet.

16 INCH.

In Orms and Smith streets, (North Providence),	67 feet.
Including 1 cut pipe, 4 branches and 2 curved pipes,	
Previously,	15,571 feet.
Total,	15,638 feet.

12 INCH.

In Messer and Thayer streets,	347 feet.
Including 4 cut pipes, 3 branches, 1 gate, and 1 sleeve,	
Previously,	24,027 feet.
Total,	24,374 feet.

10 INCH.

In Gaspee street,	787 feet
Including 5 cut pipes, 4 branches, 1 curved pipe, 1 bevel hub and 1 gate,	
Previously,	7,672 feet.
Total,	<u>8,459 feet.</u>

8 INCH.

In Martin street, and in Douglas avenue, and Martin street (North Providence,) . . .	1,559 feet.
Including 10 cut pipes, 7 branches, 4 curved pipes and 1 gate.	
Previously,	56,824 feet.
Total,	<u>58,383 feet.</u>

6 INCH.

In Andrew, Anthony, Bond, Cushing, Dorrance, Gilmore, Grove, Hudson, Laura, Public, Railroad Crossing and Ring streets; in Orms and Smith streets, (North Providence;) for Builders' Iron Foundry, from Coddling street, and for Providence Gas Company, from Langley street, . . .	10,607 feet.
Including 55 cut pipes, 25 branches, 10 curved pipes, 2 bevel hubs, 19 gates, and 1 sleeve.	
Previously,	302,353 feet.
Total,	<u>312,960 feet.</u>
Total of all sizes during the last quarter, or 8.27 miles,	17,267 feet.
Previously, including 20 and 36 inch, of which none have been laid during the last quarter,	477,670 feet.
Total,	<u>494,937 feet.</u> or 93.73 miles.

Thirty-nine fire hydrants have been set since the date of the last quarterly report, one in each of the following locations, those marked * being in North Providence :

Amos	street,	south-west corner of North Main street.
Anthony	"	east side, half-way between Atwell's avenue and Federal street.
Brownell	"	south side, about half-way between Park and Holden streets.
Bourn	"	west side, about half-way between Atwell's avenue and Broadway.
Bucklin	"	east side, about half-way between Carter and Hawthorn streets.
C	"	north-east corner of Booth street.
Carter	"	" " Vineyard street.
Cherry	"	north-west " Mulberry street.
Cushing	"	north side, about half-way between Prospect and Congdon streets.
*Douglas	avenue,	opposite south line of Crawford street.
Earl	street,	north-east corner of Bucklin street.
Friend	"	north-west corner of North Main street.
Gaspee	"	east side, about 260 feet south of Smith st.
"	"	south-east side, about 160 feet south of angle at Railroad Crossing street.
Greenwich	"	south-west corner of Hawthorn street.
"	"	" " Redwing street.
Gilmore	"	north side, about 210 feet east of Lester st.
Grove	"	south-west corner of Andrew street.
Hudson	"	south side, about 150 feet east of Sycamore street.
Laura	"	north-east corner of Niagara street.
"	"	" " Hamilton street.
Martin	"	north side, opposite east line of Clayton st.
* "	"	north-east corner of Evans street.
* "	"	" " first alley east of Douglas avenue.
Messer	"	south-east corner of Hudson street.

*Orms	street,	south-west corner of Winthrop street.
Plane	"	west side, about 420 feet north of Lockwood street.
Public	"	south side, about 240 feet east of Austin st.
"	"	" " 125 " " Plane st.
"	"	" " 210 " west of Eddy st.
"	"	south-east corner of Burnside street.
"	"	south side, about 200 feet west of Prairie avenue.
"	"	south side, about 500 feet east of Broad st.
Ring	"	north side, about 180 feet east of Tobey st.
*Smith	"	south corner of Orms street.
* "	"	south side, about 120 feet east of Franklin street.
* "	"	south-west corner of Martin street.
Weeden	"	west side, about half way between Atwell's avenue and Federal street.
Weybosset	"	east side, 30 feet north of Hay street.

The total number of fire hydrants is now seven hundred and twenty-eight.

Thirty-two Ball & Fitts' Water Meters, made by the Union Water Meter Co., and ninety-two Worthington Water Meters, have been put in at the expense of water takers, since the date of the last report. One Ball & Fitts' two-inch Water Meter was set October 13th, and one Worthington four-inch Water Meter was set October 9th, at the expense of the city.

There are eleven hundred and seventy-five water meters now in use, viz:

906 five-eighths inch.

156 three quarters inch.

64 one inch.

40 one and one-half inch.

7 two inch.

2 four inch.

The total number of applications for a supply of water is five thousand two hundred and thirty-one.

The number of service stops opened during the last quarter is two hundred and eighty-four; four of which are for fire purposes only.

The total number of service stops opened to date is thirty-five hundred and fifteen.

Three stops have been closed during the last quarter for non-payment of bills, all of which have been re-opened on payment of bills, and penalty in each case of two dollars. One stop was closed to enable the owner to set a meter, there being no stop-cock on the premises, and was re-opened on payment of two dollars. Five stops, closed for non-payment, remain unopened. Since the commencement, five service pipes have been taken up, their being no longer use for them; the use of five others has been discontinued, but remain in view of possible contingencies.

Water is now supplied for the following uses :

6 bakeries; 30 banks; 49 bar-rooms; 1 bath-house; 1 bath house—Turkish; 87 boarding-houses; 6 bottling establishments; 41 building purposes; 1 car-house; 2 carriage depositories; 1 Christian Union; 15 churches; 1 city barn; 1 city bridge, Point street; 1 city building; 5 city drinking fountains; 14 city drinking troughs; 728 city fire hydrants; 9 city fire steamer stations; 2 city hose houses; 6 club rooms; 12 coal yards; 1 colored shelter; 1 conservatory of music; 2 convents; 1 court house; 1 decorator, 1 Dexter Asylum; 1,541 dwellings of one family; 1,085 dwellings of two families; 95 dwellings of three families; 107 dwellings of four families; 15 dwellings of five families; 21 dwellings of six families; 4 dwellings of seven families; 4 dwellings of eight families; 2 dye houses; 3 elevators; 2 engravers; 1 express carriage house; 38 fire supplies—private; 41 fountains—private; 1 fountain—public; 1 furrier; 2,023 garden and street

hydrants; 3 gas holders; 5 gold and silver platers; 5 gold and silver refiners; 2 grain elevators; 23 green houses; 9 halls; 1 hall of Latter day Saints; 1 Home for Aged Women; 1 hospital; 15 hotels; 1 infirmary; 3 lodging-houses; 2 lumber dealers. *Manufacturing Establishments.*—2 belt and picker; 3 blank book; 2 bleacheries; 1 bologna sausage; 1 box; 1 braiding works; 2 brass foundries; 1 brewery; 1 brush; 1 butt; 6 carriage; 2 cement pipe; 1 chain; 5 cigar; 1 cigar box; 4 cloak and dress; 1 coffin; 4 confectionery; 1 corset; 3 colorers of jewelery; 7 cotton; 1 crocus; 1 distillery; 3 die-sinkers; 1 dye wood; 1 emery wheel; 1 enameler of jewelery; 1 eyelet; 2 file; 6 furniture; 1 gas; 1 gas burners; 2 gas fixtures; 1 geer; 1 hat; 1 harness; 1 horse shoe; 1 hulled corn; 2 ice cream and soda water; 1 ink; 1 iron company; 1 iron fence; 8 iron founderies; 1 Japan switch; 1 jewelers' cards; 73 jewelery; 4 lapidaries; 17 machinists; 1 mowing machine; 1 nail keg; 2 oil; 1 organ; 2 paper box; 1 paper collar; 2 paper cop tube; 1 pattern; 3 patent medicine; 1 picture frame; 2 pump; 1 reed; 1 rubber tubing; 4 sash and blinds; 1 screw; 1 sheet iron; 2 shirt; 2 silver ware; 5 soap; 1 spiral spring; 1 starch; 1 steam boiler; 2 steam engine; 1 stencil plate; 1 stove; 2 tanners; 1 tin; 4 tool; 2 top-roll; 5 woolen goods; 1 yeast. *Markets.*—29 fish; 69 meat. *Mills.*—1 drug and grain; 2 flour and grain; 5 marble works; 1 paint; 9 planing. 1 music hall; 2 odd fellows' halls; 2 opera houses; 2 orphan asylums; 5 organs; 5 oyster houses; 425 offices; 5 photographers; 5 plaster and stucco workers; 4 plumbers; 5 police stations; 11 printing establishments; 9 provision curers and packers; 7 railroads; 1 reading room; 33 restaurants; 1 roofer. *Saloons.*—4 billiard; 3 bowling; 5 ice cream; 11 lager beer; 8 oyster. *Schools.*—1 boarding; 9 private; 27 public; 1 reform. *Shops.*—21 barber; 6 blacksmith; 8 carpenter; 3 cooper; 1 junk; 6 paint; 1 painter; 4 shoemaker; 20 tailors; 5 tinman. *Stables.*—6 hacks; 37 livery; 156 private; 2 sale; 49 work. 12 steamboats; 13 steamships; 5 steam and gas pipe fitters. *Stores.*—1 agricultural implements;

29 apothecary; 1 auction; 4 book; 22 boot and shoe; 1 carpet; 1 carriage trimmings; 10 cigar; 16 clothing; 7 confectionery; 2 drug; 20 dry goods; 73 fancy goods; 7 flour and grain; 11 fruit; 8 furniture; 6 gents' furnishing goods; 77 grocery, retail; 14 grocery, wholesale; 6 hardware; 2 hide and leather; 2 hoop skirt; 10 house furnishing goods; 2 house paper; 3 iron and steel; 9 jewelry; 9 liquor; 1 lime and brick; 2 manufacturers' supplies; 13 millinery; 7 newspaper; 3 oil and paint; 2 paper and paper stock; 6 produce, wholesale; 3 sewing machines; 3 stationery; 2 stove; 3 tea; 2 trunk; 1 umbrella; 1 wool; 2 woolen goods; 15 not classed. 1 store house; 2 undertakers; 1 United States Custom house building; 2 upholsterers; 2 water boats; 1 wheelwright; 1 wood turner; 3 wood yards.

The amount of expenditures during the last quarter, is	\$285,188.79
The total amount of expenditures, is	3,088,060.74
The total amount of appropriations, is	3,200,000.00
The unexpended balance, is	111,939.26
The amount received during the last quarter, all of which has been paid to the city treasurer, is	
For water supplies,	\$17,691.23
For water meters,	3,663.10
For penalties,	8.00
For sundries,	7,031.69
	<hr/> 28,394.02
The amount received for water in 1872, was	41,003.51
The amount received for water in 1873, was	97,386.09
The total amount received for water to date, is	138,389.60
The amount of all receipts to date, is	237,810.73

The Commissioners ask for no appropriation at this time.

A schedule of bills approved during the last quarter, and of receipts during the same time, and a trial balance of Ledger, December 31, 1873, are hereunto appended and made parts of this report.

A separate report of that portion of the duties of the Water Commissioners which relates to Sewers, is presented herewith.

JOSEPH J. COOKE,	}	<i>Water Commissioners.</i>
CHAS. E. CARPENTER,		
WILLIAM CORLISS,		

SCHEDULE OF BILLS APPROVED BY THE WATER COMMISSIONERS, FROM OCTOBER 1, 1873, TO DECEMBER 31, 1873, INCLUSIVE.

3568	Charles H. Pierce, paid by him for labor at Hope Engine House,	\$90 40
3569	Snow & Lewis, on account for cement,	1,500 00
3570	Thomas Phillips & Co., on account for tin lined lead pipe,	800 00
3571	W. A. Burdick, Agent, drinking trough,	200 00
3572	Hammond, Angell & Co., printing,	287 40
3573	<div style="display: flex; align-items: center;"> <div style="flex: 1;"> <div style="border-left: 1px solid black; padding-left: 5px;"> Albert Dalley, William H. Gale, Achibald B. Rice, </div> <div style="flex: 1; padding-left: 10px;"> <div style="border-left: 1px solid black; border-right: 1px solid black; padding: 0 5px;"> services as referees in the matter in dispute, between the City of Providence, represented by its Water Commissioners and Freeborn John- son & Co., </div> </div> </div> </div>	25 00
3574	Hopkins & Pomroy, coal,	1,565 66
3575	" " cement, lime, carting bricks, &c.,	2,831 31
3576	" " " " " " " "	1,316 32
3577	" " coal,	1,286 16
3578	Fales, Jenks & Sons, on account for work delivered,	20,000 00
3579	Calvin C. Campbell, " " granite rubble,	200 00
3580	Schooner Dexter, freight of water pipes, (charged to Warren Foundry and Machine Co.,)	96 36
3581	Ira Mathewson, lightning rods at Hope Engine House,	107 50
3582	Read & Richards, labor in construction of Hope Engine House,	3,000 00
3583	Providence Steam Engine Co., labor, castings, &c.,	115 09
3584	Lobdell & Newmans, on account for construction of Hope Reservoir,	8,800 00
3585	G. B. & W. F. Inman, trenching and back-filling and laying water pipes,	5,800 00
3586	G. B. & W. F. Inman, setting fire hydrants, repairing streets, &c.,	416 36
3587	G. B. & W. F. Inman, carting pipes,	544 50
3588	George W. Smith, labor at Sockanosset Reservoir,	25 00
3589	Michael Tallant, " " Hope Engine House,	72 00
3590	Charles H. Pierce, paid by him for labor at Hope Pumping Station,	366 78
3591	Samuel M. Gray, paid by him for labor at Pettaconset,	5,004 80
3592	John W. Mathewson & Co., on account for granite,	3,160 00
3593	Calvin C. Campbell, " " " " "	2,005 60
3594	Taunton Brick Co., " " " bricks,	6,000 00
3595	George W. Smith, cutting curbstones for hydrant boxes,	36 00
3596	George E. Sammis, spikes,	10 20
3597	Providence and New York Steamship Co., freight of meters,	10 20
3598	Providence Gas Company, gas,	12 88
Amount carried forward,		\$65,655 78

	Amount brought forward,	-	-	-	\$65,665 78
3599	Benoit & Wood, mounted paper, &c.,	-	-	-	21 00
3600	N. Webber, rubber boots, -	-	-	-	21 00
3601	Cleveland & Brothers, office furniture, &c.,	-	-	-	54 75
3602	Akerman & Co., blank books, &c., -	-	-	-	79 75
3603	Henry W. Clapp, sewer caps, used at Pettaconset,	-	-	-	89 00
3604	H. B. Bowen, hydrant bolts, -	-	-	-	261 90
3605	Henry R. Worthington, water meters, -	-	-	-	1,628 00
3606	Union Water Meter Co., " " -	-	-	-	526 25
3607	William H. Miller & Co., repairing tools, &c., -	-	-	-	117 17
3608	Builder's Iron Foundry, special castings, valve covers and rings, -	-	-	-	2,405 36
3609	Daniel F. Burlingame, sharpening stone tools, &c., -	-	-	-	196 19
3610	Dexter Gorton & Co., lumber, carpenter's work, &c., -	-	-	-	2,059 17
3611	M. D. Copeland, carting bricks to Pettaconset, -	-	-	-	543 16
3612	Fuller Iron Works, special castings and valve boxes, -	-	-	-	1,883 74
3613	Stephen Knobb, carting stone, -	-	-	-	50 70
3614	Schooner Frederic Hall, freight of bricks, (charged to S. F. & J. A. Gray,) -	-	-	-	245 00
3615	S. F. & J. A. Gray, on account of bricks, -	-	-	-	1,300 00
3616	Charles H. Pierce, salary as assistant engineer, -	-	-	-	250 00
3617	Samuel M. Gray, " " " " &c., -	-	-	-	335 00
3618	Charles H. Swan, " " " " -	-	-	-	166 67
3619	Otis F. Clapp, " " " " -	-	-	-	208 33
3620	Howard A. Carson, " " " " -	-	-	-	208 33
3621	William T. Schneider, " " " " -	-	-	-	100 00
3622	C. Frank Allen, " " " " -	-	-	-	125 00
3623	John E. Bowen, " " " " -	-	-	-	100 00
3624	Lucius J. Sampson, " " " " -	-	-	-	83 33
3625	George H. Slade, " " " " -	-	-	-	83 33
3626	Daniel D. Waterman, " " " " -	-	-	-	66 67
3627	George F. Munro, " " student and assistant engineer, -	-	-	-	61 83
3628	Charles F. Janes, " " service pipe engineer, -	-	-	-	100 00
3629	William F. Janes, " " assistant service pipe engineer, -	-	-	-	66 67
3630	Augustus F. Nagle, " " mechanical engineer, -	-	-	-	200 00
3631	Leprlete Sweet, 2d, " " student, engineering department, -	-	-	-	41 67
3632	Henry N. Francis, " " " " " " -	-	-	-	41 67
3633	Edmund B. Weston, " " " " " " -	-	-	-	41 67
3634	Louis R. Daniels, " " " &c. " " -	-	-	-	80 00
3635	Walter R. Jackson, " " " " " " -	-	-	-	33 33
3636	Edwin P. Dawley, " " " " " " -	-	-	-	33 33
3637	Charles M. Hunt, " " " " " " -	-	-	-	25 00
3638	Frank B. Ferris, " " " " " " -	-	-	-	25 00
3639	Thomas L. Botts, " " " " " " -	-	-	-	25 00
3640	William H. Olmstead, salary as student, engineering dept., -	-	-	-	25 00
3641	William M. Brown, Jr., " " " " " " -	-	-	-	33 33
3642	Joshua C. Drown, Jr., " " clerk, " " -	-	-	-	75 00
3643	Walter F. Slade, " " service pipe clerk, " -	-	-	-	83 33
3644	William H. Turner, salary as clerk, engineering department, -	-	-	-	100 00
	Amount carried forward,	-	-	-	\$79,936 41

REPORT OF THE WATER COMMISSIONERS.

19

	Amount brought forward,	-	-	-	\$79,936 41
3645	William Aplin, salary as clerk, &c., engineering department,	-	-	-	83 33
3646	Daniel C. Stone, salary as temporary office assistant, engineering department,	-	-	-	27 60
3647	Louis W. Peck, salary as temporary office assistant, engineering department,	-	-	-	8 00
3648	Irving H. Potter, salary as temporary office assistant, engineering department,	-	-	-	29 70
3649	Andrew B. Purdy, salary as superintendent of pipe work,	-	-	-	166 67
3650	Elbert Purdy, " " inspector on pipe line,	-	-	-	108 00
3651	William H. Patterson, " " " " "	-	-	-	108 00
3652	Foster S. Dennis, Jr, " " " " "	-	-	-	52 00
3653	Samuel R. Eccleston, " " " of pipes, &c.,	-	-	-	122 00
3654	S. Horace Wheeler, " " " " service pipes,	-	-	-	125 00
3655	Henry M. Wilcox, " " assistant inspector of service pipes,	-	-	-	85 00
3656	Frederic A. Arnold, " " inspector of water fixtures,	-	-	-	83 33
3657	Henry G. Dennis, salary as superintendent of pipe yard,	-	-	-	125 00
3658	Richard M. Wood, " " clerk at pipe yard,	-	-	-	66 67
3659	Jephtha Baker, " " keeper of Nockanosset Reservoir,	-	-	-	75 00
3660	George F. Battey, salary as pumping engineer,	-	-	-	100 00
3661	John Hamilton, " " fireman,	-	-	-	80 00
3662	George F. Barney, " " " " "	-	-	-	60 00
3663	Burrows Chace, " " inspector at Hope Reservoir,	-	-	-	110 00
3664	Alexis C. Miller, " " " " " "	-	-	-	105 00
3665	George H. DeForest, " " timekeeper, " "	-	-	-	97 50
3666	William F. Tanner, " " axeman,	-	-	-	50 00
3667	John Murphy, " " " " "	-	-	-	34 00
3668	Leonard N. Austin, Jr., salary as commissioners' clerk,	-	-	-	66 67
3669	Thomas C. Gushee, " " " " "	-	-	-	83 33
3670	Phillip S. Chase, " " " " "	-	-	-	125 00
3671	Clinton D. Sewell, " secretary of water commissioners,	-	-	-	200 00
3672	George F. Johnson, care of rooms,	-	-	-	58 50
3673	Corliss Steam Engine Co., labor, &c.,	-	-	-	38 13
3674	Darling, Brown & Sharpe, box wood scales,	-	-	-	7 00
3675	A. C. Eddy & Studleys, packing,	-	-	-	7 72
3676	W. E. Barrett & Co., iron tray coal barrow,	-	-	-	25 00
3677	Providence & Newport Lead Works, lead,	-	-	-	47 32
3678	Isaac A. Sherman, carting safe to Hope Pumping Station,	-	-	-	6 00
3679	Providence Gas Co., pipe, elbows, tees and labor,	-	-	-	26 38
3680	M. D. Copeland, teaming,	-	-	-	216 00
3681	Wood & Winsor, machinists' work, use of tools, &c.,	-	-	-	180 12
3682	Charles H. Pierce, paid by him for sundries,	-	-	-	45 31
3683	Samuel M. Gray, horse hire, &c.,	-	-	-	82 47
3684	Charles H. Pierce, paid by him for labor at wharf,	-	-	-	738 42
3685	William S. Briggs, horse hire by engineers,	-	-	-	69 00
3686	William H. Miller, tools, &c.,	-	-	-	70 29
	Amount carried forward,	-	-	-	\$83,930 87

	Amount brought forward,	-	-	-	\$83,930 87
3687	G. & C. P. Hutchins, oil, lanterns, &c.,	-	-	-	63 00
3688	Lobdell & Newmans, extra labor, &c., at Hope Pumping Station,	-	-	-	250 28
3689	W. Congdon & Sons, steel tape, wire, &c.,	-	-	-	38 20
3690	Union Water Meter Co., water meters,	-	-	-	1,008 80
3691	W. A. Burdick, Agent, stone paving at Hope Reservoir, &c.,	-	-	-	2,385 70
3692	Freeborn Johnson & Co., building cottages at Pettaconset, per referees' award,	-	-	-	1,645 37
3693	Baker & Howe, models, &c.,	-	-	-	47 86
3694	Thomas J. Hill, rent of wharf,	-	-	-	500 00
3695	Samuel M. Gray, paid by him for labor at Pettaconset,	-	-	-	1,000 00
3696	Gladding Brothers & Tibbitts, stationery,	-	-	-	110 53
3697	W. A. Burdick, Agent, cut granite,	-	-	-	3,200 00
3698	Samuel M. Gray, paid by him for labor at Hope Pumping Station,	-	-	-	1,161 83
3699	Thomas Phillips & Co., laying service pipes,	-	-	-	287 08
3700	" " " " " " " "	-	-	-	850 14
3701	Samuel M. Gray, paid by him for labor at Pettaconset,	-	-	-	3,726 25
3702	" " " " " " " "	-	-	-	400 00
3703	" " " " " " " " Hope Engine House,	-	-	-	124 00
3704	George W. Smith, cutting curbstones for hydrant boxes,	-	-	-	15 00
3705	Lobdell & Newmans, on account of construction of Hope Reservoir,	-	-	-	9,625 00
3706	G. B. & W. F. Inman, trenching and back filling and laying water pipes,	-	-	-	5,100 00
3707	G. B. & W. F. Inman, setting fire hydrants, repairing streets, &c.,	-	-	-	227 53
3708	G. B. & W. F. Inman, carting pipes,	-	-	-	201 53
3709	Warren Foundry and Machine Co., cast iron water pipes,	-	-	-	3,975 87
3710	" " " " " " " "	-	-	-	15,031 95
3711	Clyde's Iron Line of Steamships, freight of iron beams, (charged to Phenix Iron Co.,)	-	-	-	30 08
3712	Phenix Iron Company, iron beams,	-	-	-	1,905 07
3713	Thomas Phillips & Co., on account of service pipe, laying service pipe, &c.,	-	-	-	2,250 00
3714	John W. Mathewson & Co., stone delivered at Pettaconset,	-	-	-	1,734 74
3715	George W. Hall & Co., drain pipe, cartage, &c.,	-	-	-	656 40
3716	Daniel F. Burlingame, sharpening stone tools, &c.,	-	-	-	132 26
3717	Lobdell & Newmans, extra labor, &c., at Hope Pumping Station,	-	-	-	639 70
3718	Wm. D. Andrews & Bro., use of drainage pump, &c.,	-	-	-	1,206 32
3719	Builders' Iron Foundry, special castings, &c.,	-	-	-	876 38
3720	Fuller Iron Works,	-	-	-	1,328 63
3721	Warren Foundry and Machine Co., cast iron water pipes, &c.,	-	-	-	144 68
3722	T. & W. Breck, rent of offices, &c.,	-	-	-	762 50
3723	G. & T. H. Colvin, standards for drinking fountains,	-	-	-	209 44
3724	Dexter Gorton & Co., carpenters' work, lumber, &c.,	-	-	-	4,307 22
3725	Fales, Jenks & Sons, on account for work delivered,	-	-	-	16,000 00
3726	S. F. & J. A. Gray, bricks,	-	-	-	306 27
	Amount carried forward,	-	-	-	\$167,506 48

	Amount brought forward,	-	-	-	\$167,506 48
3727	Hopkins & Pomroy, coal, cement, carting bricks, &c.,	-	-	-	3,077 87
3728	Read & Richards, masons' labor, &c.,	-	-	-	616 70
3729	Calvin C. Campbell, granite,	-	-	-	10,194 47
3730	Granite Railway Co.,	-	-	-	843 77
3731	Samuel M. Gray, paid by him for labor at Pettaconset,	-	-	-	250 00
3732	James Carroll, carting sand and gravel,	-	-	-	126 00
3733	Stephen Knobb, carting stone,	-	-	-	72 86
3734	Steamer Middlesex, freight of water pipes, (charged to Warren Foundry and Machine Co.,)	-	-	-	132 55
3735	Charles H. Pierce, salary as assistant engineer,	-	-	-	250 00
3736	Samuel M. Gray, " " " " &c.,	-	-	-	335 00
3737	Charles H. Swan, " " " " "	-	-	-	166 67
3738	Otis F. Clapp, " " " " "	-	-	-	208 33
3739	Howard A. Carson, " " " " "	-	-	-	208 33
3740	William T. Schneider, " " " " "	-	-	-	100 00
3741	C. Frank Allen, " " " " "	-	-	-	125 00
3742	John E. Bowen, " " " " "	-	-	-	100 00
3743	Lucius J. Sampson, " " " " "	-	-	-	83 33
3744	George H. Slade, " " " " "	-	-	-	83 33
3745	Daniel D. Waterman, " " " " "	-	-	-	66 67
3746	George F. Munro, " " " " "	-	-	-	83 33
3747	Leprilete Sweet, 2d, " " student and assistant engineer,	-	-	-	70 83
3748	Charles F. Janes, " " service pipe engineer,	-	-	-	100 00
3749	William F. Janes, " " assistant service pipe engineer,	-	-	-	66 67
3750	Augustus F. Nagle, " " mechanical engineer,	-	-	-	200 00
3751	Henry N. Francis, " " student, engineering department,	-	-	-	41 67
3752	Edmund B. Weston, " " " " "	-	-	-	41 67
3753	Louis R. Daniels, " " " &c., " " "	-	-	-	13 33
3754	Walter R. Jackson, " " " " "	-	-	-	33 33
3755	Edwin P. Dawley, " " " " "	-	-	-	33 33
3756	Charles M. Hunt, " " " " "	-	-	-	25 00
3757	Frank B. Ferris, " " " " "	-	-	-	25 00
3758	Thomas L. Botts, " " " " "	-	-	-	25 00
3759	William H. Olmstead, salary as student &c., engineering dept.,	-	-	-	28 60
3760	William M. Brown, Jr., " " " " "	-	-	-	33 33
3761	Daniel O. Stone, " " &c., " " "	-	-	-	38 73
3762	Walter F. Slade, salary as service pipe clerk, engineering department,	-	-	-	83 33
3763	Joshua C. Drown, Jr., salary as clerk, engineering department,	-	-	-	75 00
3764	William Applin, salary as clerk, engineering department,	-	-	-	83 33
3765	William H. Turner, salary as clerk engineering department,	-	-	-	100 00
3766	Irving H. Potter, " " temporary office assistant engineering department,	-	-	-	36 45
3767	Andrew B. Purdy, salary as superintendent of pipe work,	-	-	-	106 67
3768	Elbert Purdy, " " inspector on pipe line,	-	-	-	100 00
3769	William H. Patterson, " " " " "	-	-	-	100 00
3770	Samuel R. Eccleston, " " " of pipes,	-	-	-	125 00
3771	S. Horace Wheeler, " " " of service pipes,	-	-	-	125 00
	Amount carried forward,	-	-	-	\$186,401 96

	Amount brought forward,	-	-	-	\$186,401 96
3772	Henry M. Wilcox, salary as assistant inspector of service pipes,	-	-	-	85 00
3773	Frederic A. Arnold, salary as inspector of water fixtures,	-	-	-	83 33
3774	Henry G. Dennis, " " superintendent of pipe yard,	-	-	-	125 00
3775	Richard M. Wood, " " clerk at pipe yard,	-	-	-	66 67
3776	Jeptha Baker, " " keeper of Sockanosset Reservoir,	-	-	-	77 50
3777	George F. Battey, salary as pumping engineer,	-	-	-	100 00
3778	John Hamilton, " " fireman,	-	-	-	80 00
3779	George F. Barney, " " " " "	-	-	-	60 60
3780	Burrows Chace, " " inspector at Hope Reservoir,	-	-	-	135 00
3781	Alexis O. Miller, " " " " " "	-	-	-	105 00
3782	George H. DeForest, " " time keeper, " " "	-	-	-	96 45
3783	C. C. Carpenter, " " inspector of masonry,	-	-	-	32 00
3784	John Murphy, " " axeman,	-	-	-	50 00
3785	William F. Tanner, " " " " "	-	-	-	42 60
3786	Leonard N. Austin, Jr., salary as commissioner's clerk,	-	-	-	66 67
3787	Thomas C. Gushue, " " " " "	-	-	-	83 33
3788	Philip S. Chase, " " " " "	-	-	-	125 00
3789	Clinton D. Sellew, salary as secretary of water commissioners,	-	-	-	200 00
3790	George F. Johnson, care of rooms,	-	-	-	54 50
3791	Charles H. Pierce, paid by him for sundries,	-	-	-	41 77
3792	" " " " " " labor at wharf,	-	-	-	741 58
3793	Moulton & Ingraham, stakes and strips, engineers' department,	-	-	-	6 74
3794	Yetter & Wack, sprinkling street,	-	-	-	10 00
3795	Providence and New York Steamship Co., freight of water meters,	-	-	-	18 25
3796	William H. Miller & Co., tools, repairing tools, &c.,	-	-	-	61 06
3797	William E. Barrett & Co., tools, &c.,	-	-	-	85 30
3798	W. P. Knickerbocker & Co., rope,	-	-	-	42 26
3799	William S. Briggs, horse hire, by engineers,	-	-	-	44 00
3800	C. J. Wheeler, advertising,	-	-	-	120 00
3801	Kenneth McKay, labor at Hope Engine House,	-	-	-	125 37
3802	Boston Machine Co, post hydrants,	-	-	-	135 00
3803	M. D. Copeland, teaming, &c.,	-	-	-	248 35
3804	Henry B. Worthington, water meters,	-	-	-	1,181 00
3805	Freeborn & Crowell, labor, &c., at Hope Engine House, cottages at Pettaconset, &c.,	-	-	-	888 42
3806	Samuel M. Gray, horse hire, &c.,	-	-	-	112 78
3807	William M. Bender & Co., tiles for drain,	-	-	-	77 84
3808	Samuel M. Gray, paid by him for labor at Hope Pumping Station,	-	-	-	631 54
3809	Charles H. Pierce, labor setting blow-off,	-	-	-	21 00
3810	Freeborn & Crowell, labor, &c., at Hope Engine House,	-	-	-	218 40
3811	Snow & Lewis, cement,	-	-	-	1,162 25
3812	Samuel M. Gray, paid by him for labor at Pettaconset,	-	-	-	4,062 15
3813	Daniel F. Burlingame, repairing tools, &c.,	-	-	-	95 87
	Amount carried forward,	-	-	-	\$198,404 94

	Amount brought forward,	-	-	\$198,204 94
3814	Dexter Gorton & Co., carpenters' work, lumber, &c.,	-	-	1,376 12
3815	Taunton Brick Co., bricks, -	-	-	7,112 29
3816	Samuel M. Gray, paid by him for labor at Pettaconset,	-	-	500 00
3817	Charles Stafford, et al, payment of execution issued on judgment rendered by the Supreme Court,	-	-	24,742 13
3818	George W. Smith, cutting curbstones for hydrant boxes,	-	-	6 00
3819	Lobdell & Newmans, on account of construction of Hope Reservoir,	-	-	7,300 00
3820	W. A. Burdick, Agent, granite,	-	-	2,250 00
3821	G. B. & W. F. Inman, trenching and back-filling and laying water pipes,	-	-	2,700 00
3822	G. B. & W. F. Inman, carting pipes,	-	-	143 10
3823	Thomas Phillips & Co., on account of tin lined lead pipe, and laying service pipe,	-	-	1,000 00
3824	G. B. & W. F. Inman, on account of reservations in former bills,	-	-	9,000 00
3825	Wood & Winsor, pipe, tees, nipples, elbows, &c.,	-	-	92 33
3826	John W. Mathewson & Co., granite,	-	-	2,098 10
3827	Warren Foundry and Machine Co., on account of iron pipes,	-	-	3,326 67
3828	W. A. Burdick, Agent, granite,	-	-	2,000 00
3829	J. W. Moore, roofing, cement, labor, &c.,	-	-	41 31
3830	M. D. Copeland, teaming,	-	-	127 18
3831	B. F. Almy, cop waste,	-	-	13 00
3832	W. A. Burdick, Agent, granite,	-	-	2,160 00
3833	Olney Brothers, oil,	-	-	76 27
3834	Dexter Gorton & Co., carpenters' work, lumber, &c.,	-	-	431 37
3835	Stephen Knobb, carting granite,	-	-	17 44
3836	John A. Moore, teaming,	-	-	123 49
3837	Wm. H. Miller & Co., repairing tools, &c.,	-	-	110 61
3838	Nelson Titus, carting pile driver to Pettaconset, &c.,	-	-	72 00
3839	Tuttle & Hobbs, roan horse,	-	-	175 00
3840	Builders' Iron Foundry, special castings, &c.,	-	-	113 02
3841	Schooner Fashion, freight of water pipes, (charged to Warren Foundry and Machine Co.,)	-	-	201 74
3842	Fuller Iron Works, special castings and valve boxes,	-	-	2,290 31
3843	Charles H. Pierce, paid by him for labor repairing streets,	-	-	19 85
3844	Hopkins & Pomroy, coal, cement and carting bricks,	-	-	4,127 87
3845	Providence Steam Engine Co., machinists' labor, &c.,	-	-	346 99
3846	W. Coleman & Sons, blocks, and repairing blocks,	-	-	16 20
3847	Samuel M. Gray, paid by him for labor at Pettaconset,	-	-	200 00
3848	Calvin C. Campbell, granite, and labor on granite,	-	-	1,348 66
3849	Providence Steam & Gas Pipe Co., pipe, elbows, tees, couplings, &c.,	-	-	212 83
3850	J. Herbert Shedd, salary as chief engineer,	-	-	2,000 00
3851	Charles H. Pierce, salary as assistant engineer,	-	-	250 00
3852	Samuel M. Gray, " " " " &c.,	-	-	335 00
3853	Charles H. Swan, " " " " -	-	-	166 67
3854	Otis F. Clapp, " " " " -	-	-	208 33
3855	Howard A. Carson, " " " " -	-	-	208 33
	Amount carried forward,	-	-	\$277,265 15

	Amount brought forward,	-	-	-	\$277,265 15
3856	Wm. T. Schneider, salary as assistant engineer,	-	-	-	100 00
3857	C. Frank Allen, " " " " -	-	-	-	125 00
3858	John E. Bowen, " " " " -	-	-	-	100 00
3859	Lucius J. Sampson, " " " " -	-	-	-	83 33
3860	George H. Slade, " " " " -	-	-	-	83 33
3861	Daniel D. Waterman, " " " " -	-	-	-	66 67
3862	George F. Munro, " " " " -	-	-	-	83 33
3863	Leprilete Sweet, 2d, " " " " -	-	-	-	83 33
3864	Charles F. Jones, " " service pipe engineer, -	-	-	-	100 00
3865	William F. Jones, " " assistant service pipe engineer, -	-	-	-	66 67
3866	Augustus F. Nagle, " " mechanical engineer, -	-	-	-	200 00
3867	Henry N. Francis, " " student, engineering department, -	-	-	-	41 67
3868	Edmund B. Weston, " " " " " -	-	-	-	41 67
3869	Walter R. Jackson, " " " " " -	-	-	-	33 33
3870	Edwin P. Dawley, " " " " " -	-	-	-	33 33
3871	Charles M. Hunt, " " " " " -	-	-	-	25 00
3872	Frank B. Ferris, " " " " " -	-	-	-	25 00
3873	Thomas L. Botts, " " " " " -	-	-	-	25 00
3874	William H. Olmstead, " " " " " -	-	-	-	25 00
3875	William M. Brown, Jr., " " " " " -	-	-	-	33 33
3876	Daniel C. Stone, " " " " " -	-	-	-	33 33
3877	Walter F. Slade, " " service pipe clerk, engineering dep't, -	-	-	-	83 33
3878	Joshua C. Drown, Jr., " clerk, engineering department, -	-	-	-	14 52
3879	William Aplin, " " " " " -	-	-	-	83 33
3880	William H. Turner, " " " " " -	-	-	-	100 00
3881	Irving H. Potter, salary as temporary office assistant, engi- neering department, -	-	-	-	31 80
3882	Andrew B. Purdy, salary as superintendent of pipe work, -	-	-	-	166 67
3883	Elbert Purdy, " " inspector on pipe line, -	-	-	-	84 00
3884	S. Horace Wheeler, " " of service pipes, -	-	-	-	125 00
3885	Henry M. Wilcox, " " assistant inspector of service pipes, -	-	-	-	85 00
3886	Samuel R. Eccleston, " " inspector of pipes, -	-	-	-	135 00
3887	Frederic A. Arnold, " " " water fixtures, -	-	-	-	83 33
3888	Burrows Chace, " " " at Hope Reservoir, -	-	-	-	127 50
3889	Henry G. Dennis, " " superintendent of pipe yard, -	-	-	-	125 00
3890	Richard M. Wood, " " clerk at pipe yard, -	-	-	-	66 67
3891	Jeptha Baker, " " keeper of Sockanosset Reser- voir, -	-	-	-	62 50
3892	George F. Battey, salary as pumping engineer, -	-	-	-	100 00
3893	John Hamilton, " " fireman, -	-	-	-	80 00
3894	George F. Barney, " " " -	-	-	-	60 00
3895	George H. DeForest, " " timekeeper at Hope Reservoir, -	-	-	-	78 15
3896	William F. Tanner, " " axeman, -	-	-	-	49 60
3897	John Murphy, " " " -	-	-	-	43 75
3898	Leonard N. Austin, Jr., salary as commissioners' clerk, -	-	-	-	66 67
3899	Thomas C. Gushee, " " " " -	-	-	-	83 33
3900	Philip S. Chace, " " " " -	-	-	-	125 00
3901	Clinton D. Sellow, " " secretary of water commis- sioners, -	-	-	-	200 00
	Amount carried forward,	-	-	-	\$250,933 62

	Amount brought forward,	-	-	\$280,933 62
3902	Joseph J. Cooke, salary as water commissioner,	-	-	500 00
3903	Charles E. Carpenter, salary as water commissioner,	-	-	500 00
3904	William Corliss, " " " "	-	-	500 00
3905	George F. Johnson, care of rooms,	-	-	58 20
3906	Charles H. Pierce, paid by him for sundries,	-	-	85 35
3907	" " " " " " labor at wharf,	-	-	518 42
3908	Samuel M. Gray, horse hire, &c.,	-	-	105 63
3909	Clinton D. Sellew, paid by him for sundries,	-	-	55 21
3910	John H. Appleton, analyses, &c.,	-	-	32 50
3911	Gladding Brothers & Tibbitts, stationery,	-	-	55 21
3912	Valpey, Angell & Co., " "	-	-	16 39
3913	Benoit & Wood, mounted paper and brush,	-	-	15 75
3914	Hammond, Angell & Co., printing,	-	-	197 05
3915	Cleveland & Brothers, office furniture,	-	-	20 74
3916	William S. Briggs, horse hire by engineers,	-	-	18 00
3917	Tuttle & Hobbs, horse hire, &c., engineering department,	-	-	135 25
3918	M. D. Copeland, teaming,	-	-	166 72
3919	Providence and New York Steamship Co., freight of machinery and meters,	-	-	12 74
3920	G. B. & W. F. Inman, carting pipes,	-	-	128 66
3921	George W. Hall & Co., drain pipe,	-	-	21 45
3922	Johnson & Whittemore, repairing telegraph instruments, &c.,	-	-	15 76
3923	Grant Brothers, repairing wagon,	-	-	5 80
3924	A. O. Eddy & Studleys, rubber boots, &c.,	-	-	14 60
3925	Providence & Newport Lead Works, lead,	-	-	87 36
3926	Providence Concrete Co., repairing wood pavement,	-	-	37 50
3927	Lowell Felting Mills, felt,	-	-	43 26
3928	R. S. Burrough & Co., oil,	-	-	32 62
3929	Henry B. Worthington, water meters,	-	-	920 00
				<hr/>
				\$285,183 79

RECEIVED FROM OCTOBER 1, 1873, TO DECEMBER 31, 1873, INCLUSIVE, AND PAID TO THE CITY TREASURER.

1873.			
October	11.	Of Samuel M. Gray, for sundries,	\$39 00
	13.	Of John Godfrey, for three months rent of farm in Warwick, purchased of Miss Patience W. Chace, to January 8, 1874,	43 75
	20.	Of Fuller Iron Works, for old iron,	152 00
	25.	Of city of Providence, for sewer expenses,	5,368 17
November	13.	" " " "	168 00
	17.	Of Samuel M. Gray, for sundries,	12 30
	18.	Of Thomas J. Hill, for valve box covers,	29 32
	19.	Of Fuller Iron Works, for old iron,	125 68
	20.	Of Providence Tool Co., for labor and materials,	241 34
	22.	Of Beneficent Congregational Society, for labor and materials,	30 14
		Of Jeremiah Knight, 2d. for labor and materials,	6 27
	25.	Of Beneficent Congregational Society, for labor and materials,	18 29
		Of Providence Gas Co., for special castings,	15 60
	29.	" " " " for labor and materials,	6 85
December	3.	Of Phineas A. Conley, for grass and pasturage on farm purchased of S. B. Gardiner,	40 00
	6.	Of Robert H. Ives, for labor and materials,	244 23
	10.	Of Rochester Iron Works, for special castings,	31 80
		Of William M. Holloway, for three months rent of farm in Warwick, purchased of Richard U. Rhodes and wife, to March 1, 1874,	56 25
	16.	Of Samuel M. Gray, for sundries,	23 50
	17.	Of Henry G. Dennis, for wharfage,	2 50
	23.	Of Nelson Titus, for hydrant box, broken,	31 98
	27.	Of Richmond Manufacturing Co., for cast iron water pipe,	1 98
	30.	Of Peleg P. Cranston, for three months rent of Randall estate, so called, in Pawtuxet, to January 1, 1874,	50 00
		Of Dexter L. Brownell, for labor and materials,	12 44
		Of Daniel S. Hazard, " " " "	9 00
		Of Fuller Iron Works, for old iron,	271 25
		For water during the present quarter,	17,691 23
		For meters " " " "	3,663 10
		For penalties, " " " "	8 00
Total, - - - - -			\$28,394 02

TRIAL BALANCE OF LEDGER, DECEMBER 31, 1873.

DE.

Hope Reservoir, for land, . . .	\$124,122 80
" " " sundries, . . .	504 04
" " " labor, . . .	1,072 72
" " " gate chambers, . . .	971 50
" " " drain, . . .	404 03
" " " inspection, . . .	2,089 48
" " " conduit, . . .	2,498 00
" " " slope wall, . . .	99 86
" engine house, . . .	49,405 30
" pumping station, for coal and wood, . . .	825 42
" " " sundries, . . .	3 32
Night and Sunday watch at Hope engine house, . . .	41 23
Sockanosset Reservoir, for construction, . . .	177,870 72
" " " sundries, . . .	4,081 10
" " " land, . . .	16,074 35
" " " watch, . . .	1,509 25
" " " gate houses, . . .	18,585 57
" " " drain, . . .	2,229 77
" " " inspection, . . .	6,819 18
" " " extra work and materials, . . .	189 70
" " " gate chambers, . . .	19,299 27
Line of leading mains, for labor and materials, . . .	19,808 52
" " " extra trenching, etc., . . .	305 95
" " " land and damages, . . .	1,665 00
Force main line for land and damages, . . .	3,006 35
" " " labor and materials, . . .	5,099 28
" " " extra trenching, etc., . . .	832 56
Office furniture, stoves, gas fixtures, etc., . . .	1,230 06
Rent of offices, . . .	3,200 00
Books, stationery, etc., . . .	837 70
Fuel and lights, . . .	240 55
Horse-hire by commissioners, . . .	19 00
Janitor of rooms, . . .	563 00
Traveling expenses of commissioners, . . .	122 62
Clerks' salaries, . . .	5,809 51
Commissioners' salaries, . . .	25,708 79
Secretary's salary, . . .	3,366 71
Sundries, . . .	403 78
Printing, . . .	2,042 57
Advertising, . . .	1,665 50
Fences, . . .	2,050 38
Stop valves, . . .	46,992 70
Store house and work shop, . . .	1,207 38
Amount carried forward, . . .	\$604,674 52

Amount brought forward,	\$604,674 52
Rent of wharves and pipe yards,	4,329 50
Linking curved pipes,	232 75
Tools,	7,788 90
Labor on pipes,	15,448 99
Cast iron water pipes,	1,031,863 22
Special castings,	83,056 68
Lumber,	1,455 71
Fire hydrants,	68,755 66
Sockanosset hill cross road,	3,855 38
Pettaconset and Sockanosset telegraph line,	1,758 01
Dwelling houses at Pettaconset,	9,544 46
Culverts and bridge on line of force mains,	6,775 33
Culverts at Pettaconset,	3,557 92
Real estate in Warwick,	13,118 04
Water privileges, mill and other real estate, in Pawtuxet,	50,231 96
Pochasset bridge,	5,559 82
Wharf salaries,	6,349 44
Temporary engine house at Pettaconset,	9,021 32
Roads, slopes, etc., at Pettaconset,	11,454 32
Engine house at Pettaconset,	115,534 60
Natural Filter Basin,	33,167 93
Removing loam,	462 95
Iron screw piles,	3,766 46
Hydrant bolts,	1,494 29
Pipe bolts,	1,496 45
Photographs,	147 50
Hydrant heads,	6,603 84
Taps and stops,	13,533 46
Valve covers,	7,425 78
Service pipe,	25,153 49
Hydrant boxes,	18,843 01
Setting fire hydrants,	9,055 69
Valve boxes,	26,423 97
Check valves,	1,412 48
Air cocks, boxes, covers and setting,	500 05
Night and Sunday watch at engine house,	1,175 00
Pettaconset pumping station, for land,	26,373 37
Pettaconset pumping station, for sundries,	2,741 36
“ “ “ “ engineer,	3,198 28
“ “ “ “ coal and wood,	20,379 42
“ “ “ “ labor on fuel,	1,263 96
“ “ “ “ firemen,	3,096 40
Setting blow-offs,	286 66
Ascertaining and removing nuisances on Paw- tuxet river,	479 46
Rhode Island Concrete Co.,	150 00
Fales, Jenks & Sons,	40,250 00
G. B. & W. F. Inman,	57,900 00
Amount carried forward,	\$2,361,147 79

Amount brought forward,	\$2,361,147 79	
Lobdell & Newmans,	43,650 00	
John W. Mathewson & Co.,	9,142 84	
Town of Cranston,	5,000 00	
A. & W. Sprague Manufacturing Co.,	2,500 00	
Thomas Phillips & Co.,	6,450 00	
City of Providence, fountain, Abbott Park,	702 07	
Samuel M. Gray,	700 00	
W. A. Burdick, Agent,	14,935 19	
Builders' Iron Foundry,	232 92	
Providence Gas Co.,	1,093 09	
C. B. Sawyer,	1 25	
Oren A. Ballou,	238 74	
Henry W. Wilkinson,	184 43	
City Treasurer,	99,421 13	
" " for water payments,	138,389 60	
Testing pipe iron,	443 50	
Iron drain pipes and gate,	224 21	
Carting pipes,	29,985 57	
Counsel fees,	4,200 00	
Inspection of pipes,	7,967 56	
Inspection of pipe laying,	21,688 56	
Inspection of water fixtures,	1,832 07	
Testing bolts and composition castings,	34 25	
Laying water pipes,	268,331 41	
" service pipes,	20,473 21	
" suction pipe, etc ,	85 00	
Drainage pump and engine,	4,881 02	
Hydrants for street sprinklers,	1,654 38	
Temporary boarding house, at Pettaconset,	1,237 24	
Public drinking fountains and troughs,	513 46	
Expense of testing engines,	5 75	
Water meters,	35,442 15	
Water meters set, belonging to the city,	1,101 00	
Worthington pumping engine,	37,722 30	
		\$3,121,611 69

ENGINEERING DEPARTMENT. -

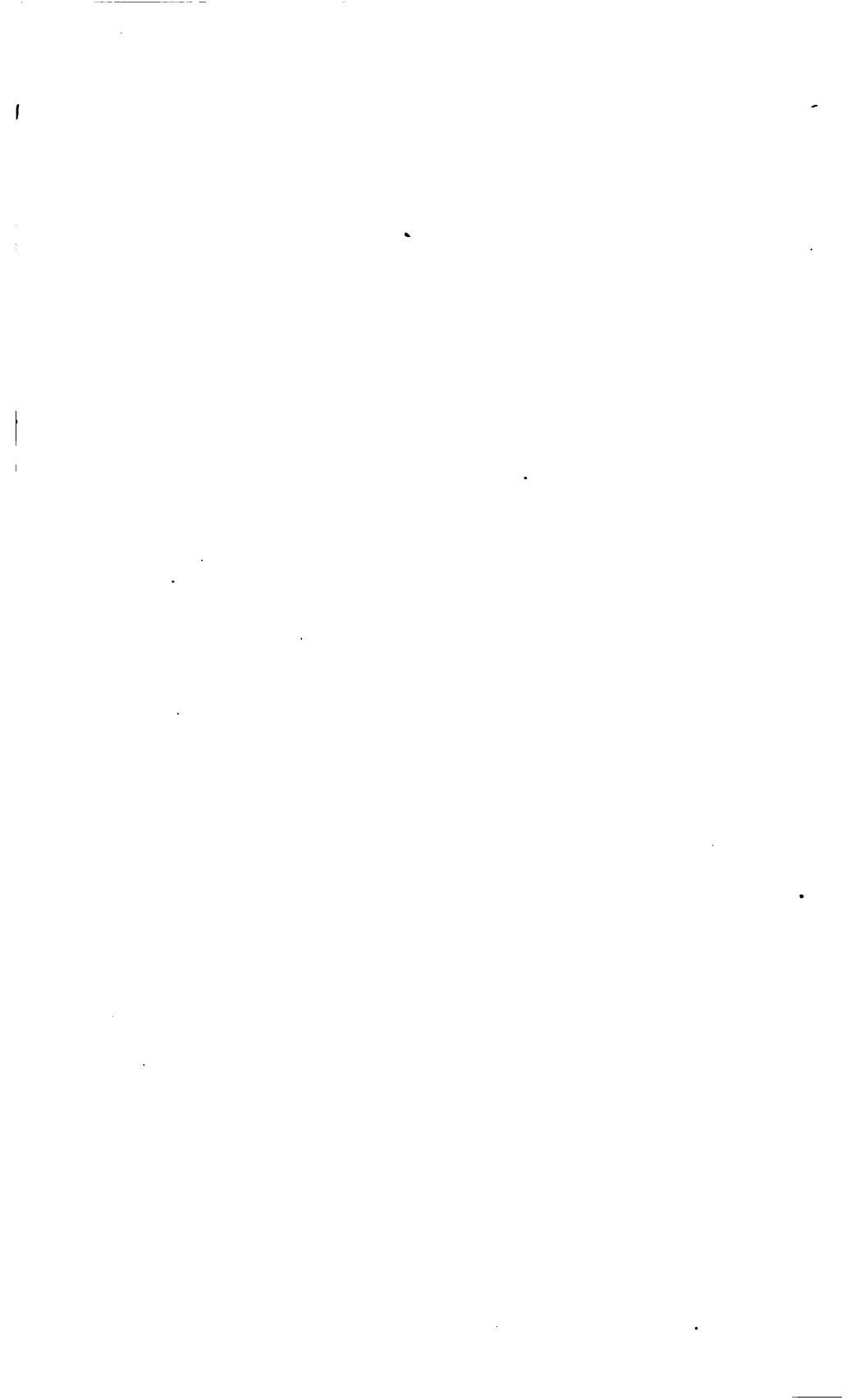
For instruments,	\$2,695 40	
Tools,	657 36	
Furniture, stoves, gas fixtures, etc.,	2,490 17	
Books, stationery, etc.,	2,511 26	
Draughting,	3,523 52	
Labor,	4,904 88	
Horse and wagon account,	1,482 72	
Horse keeping, shoeing, etc.,	1,344 70	
Horse hire,	3,320 40	
Rent of offices,	5,790 61	
Fuel and lights,	597 74	
Janitor of rooms,	1,116 58	

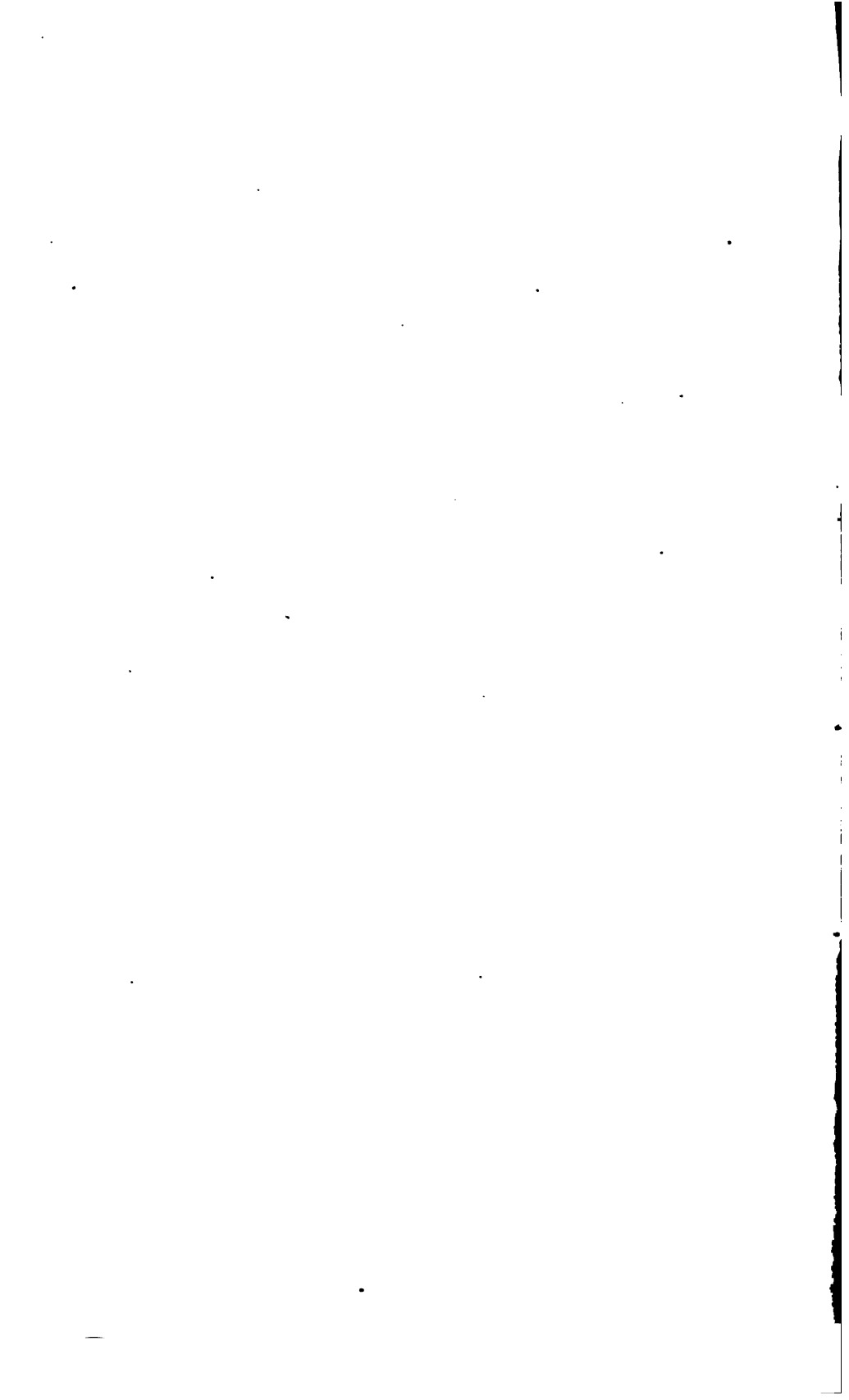
Amounts carried forward, \$30,435 34 \$3,121,611 69

Amounts brought forward, . . .	\$30,435 34	\$3,121,611 69
Experimental filter, . . .	91 08	
Sundries, . . .	2,278 79	
Test wells, . . .	1,579 40	
Consultations, . . .	827 08	
Office building, at Pettaconset, . . .	553 21	
“ “ “ Sockanosset reservoir, . . .	563 22	
Stakes and strips, . . .	704 21	
Printing, . . .	418 96	
Maps, . . .	86 67	
Service pipe experiments, . . .	295 76	
Temporary assistance, . . .	6,934 67	
Salaries, . . .	108,766 41	
		153,534 80
		<u>\$3,275,146 49</u>

CR.

Hope reservoir, for land, (rents received and buildings, etc., sold,) . . .	\$5,883 28	
Sockanosset reservoir, for land, (rents received, and wood, etc., sold,) . . .	1,534 49	
Real estate in Warwick, (rents received,) . . .	931 25	
Pettaconset pumping station, for land, (rents received,) . . .	479 89	
Water privileges, mill and other real estate, in Pawtuxet, (rents received,) . . .	2,939 53	
J. B. & J. M. Cornell, . . .	1,000 00	
Warren Foundry and Machine Co., . . .	173 26	
Interest, . . .	54 68	
Boston hydrants, . . .	28 29	
Water meters, . . .	35,589 50	
Penalties, . . .	82 00	
Water, . . .	138,389 60	
Approved bills, . . .	3,088,060 74	
		<u>\$3,275,146 49</u>





1873-74.

CITY DOCUMENT.

No. 59.

FINAL REPORT

OF THE

WATER COMMISSIONERS

OF THE

CITY OF PROVIDENCE,

(Elected September 27, 1869.)

FEBRUARY 28, 1874.



PROVIDENCE:
HAMMOND, ANGELL & CO., PRINTERS TO THE CITY.
1874.



1873-74.

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1874.



ORGANIZATION
OF THE
PROVIDENCE WATER WORKS.

BOARD OF WATER COMMISSIONERS.

JOSEPH J. COOKE, PRESIDENT.

CHARLES E. CARPENTER,

WILLIAM CORLISS.

SECRETARY OF THE BOARD OF WATER COMMISSIONERS.

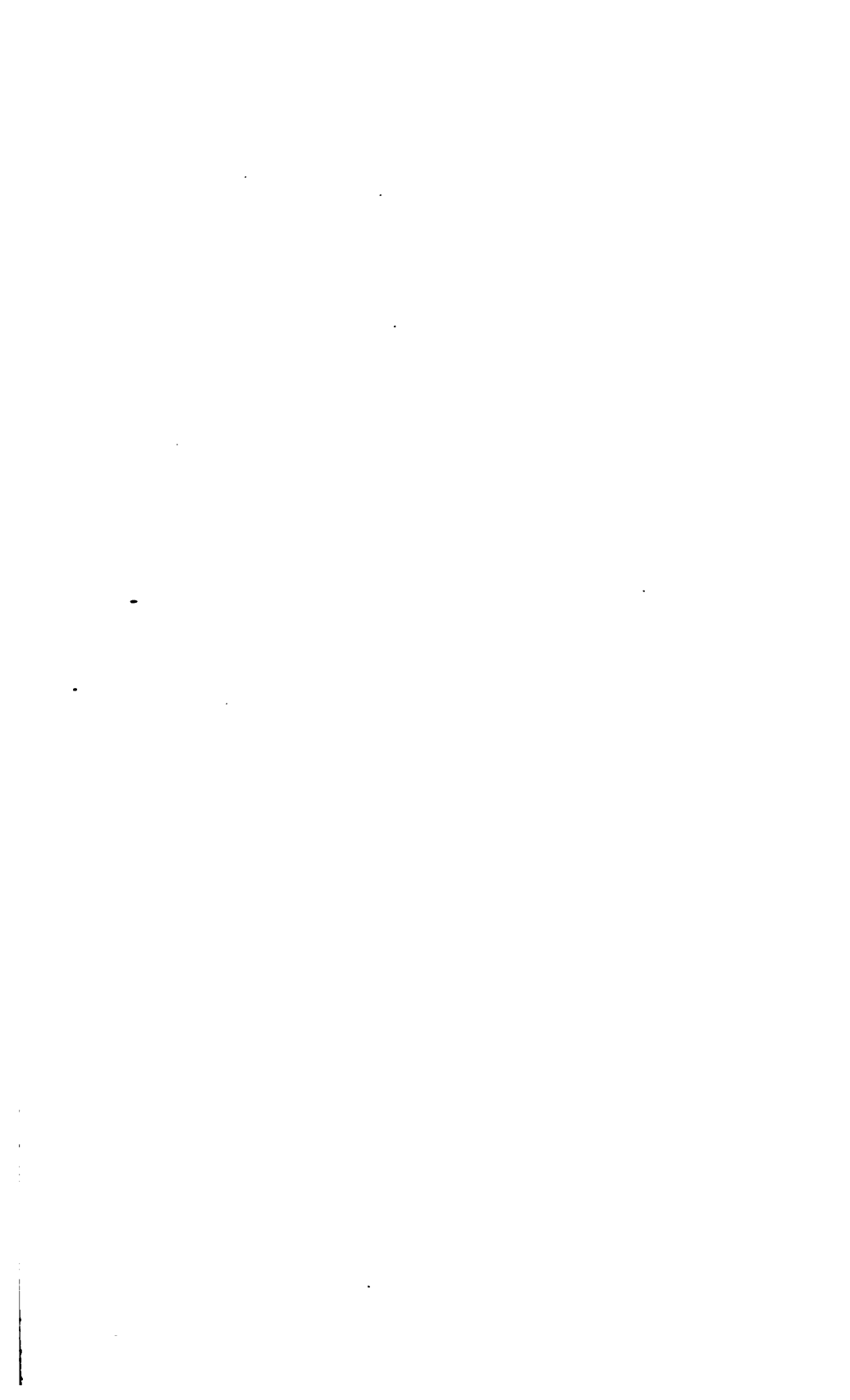
CLINTON D. SELLEW.

Office No. 35 North Main street.

CHIEF ENGINEER.

J. HERBERT SHEDD.

Office No. 35 North Main street.



REPORT.

OFFICE OF THE WATER COMMISSIONERS, }
PROVIDENCE, February 28th, 1874. }

TO THE HONORABLE THE CITY COUNCIL:

The undersigned, Water Commissioners, two of whom were elected September 27, 1869, for the term of three years, and the other, May 23, 1872, to fill the vacancy caused by the death of Moses B. Lockwood; all of whose terms of office have been twice extended by the City Council, who were thereto authorized by special acts of the General Assembly, respectfully present their final report:

A statement of the appointment of Leprilete Sweet, 2d, as Assistant Engineer, at a salary of one thousand dollars per annum, dating from November 10, 1873, was omitted from the last quarterly report. Mr. Sweet had served three years as a student in the Engineering Department.

An offer of the Fuller Iron Works, of this city, to furnish 1,200 Service Boxes, with plugs, at four cents per pound, has been accepted.

A contract has been executed with W. A. Burdick, Agent, Westerly, R. I., for furnishing dressed granite for capping beam walls, delivered on the ground at Pettaconset, for two dollars per cubic foot.

A deed prepared by the City Solicitor, and signed by the City Treasurer, in accordance with a resolution of the City Council, approved January 15, 1874, to the town of Cranston, for a public highway, of a strip of land in said town, over which a portion of "Reservoir Avenue" passes, and in which the mains leading from Sockanosset Reservoir are laid, has been delivered to the Council Clerk of said town. The said strip, lying between Sockanosset hill cross road and Pochasset bridge, was conveyed to the city by the heirs of Joseph Harris, deceased, subject to use as a public highway of said town of Cranston. On the delivery of said deed, the sum of five thousand dollars was received by the Commissioners for work, etc., in grading what is now Reservoir Avenue, in said town of Cranston.

Comparatively little out-door work has been done since the date of the last quarterly report. No water mains have been laid. No fire hydrants have been set. Work on the foundation walls of the engine-house has been prosecuted as the weather allowed. Work on the slope-wall of Hope Reservoir, and the breaking and screening of stone, has been done by the contractors for the construction of the reservoir, also, as the weather allowed. The work of constructing a retaining wall of the reservoir embankment, near Hope Pumping Station, has been carried on.

The following correspondence has been had with the Council Clerk of the Town of North Providence:

TOWN CLERK'S OFFICE, }
NORTH PROVIDENCE, Jan'y 12th, 1874. }

TO PROV. WATER COMMISSIONERS:

The following is a resolution passed by the Town Council of this town, on the 5th instant:

Resolved, That the resolution of the town Council, April 7th, 1873, in relation to laying water pipes and establishing hydrants in the town of North Providence, be and the same is hereby recinded.

ROYAL LEE, Council Clerk.

OFFICE OF THE WATER COMMISSIONERS, }
PROVIDENCE, R. I., January 14th, 1874. }

TO THE HONORABLE THE TOWN COUNCIL OF THE TOWN
OF NORTH PROVIDENCE:

A communication dated 12th instant, from Royal-Lee, Esq., Council Clerk, embracing a copy of the following resolution, passed by your Honorable Body on the 5th instant, has been received by the Water Commissioners:

"*Resolved*, That the resolution of the town Council, April 7th, 1873, in relation to laying water pipes and establishing hydrants in the town of North Providence, be and the same is hereby rescinded."

The Commissioners have instructed me to say that, while literally the resolution *rescinds* the resolution in relation to laying pipes and setting hydrants, passed April 7, 1873, they presume that the *intention* of the Council was to stop any more work under the contract created by the last named resolution and *not* to disclaim responsibility for what had been already done. *If* the Commissioners err in this matter they would be glad to be promptly informed.

JOSEPH J. COOKE, President.

TOWN CLERK'S OFFICE, }
NORTH PROVIDENCE, R. I., Jan'y 15th, 1874. }

WATER COMS, GENT:

Yours of the 14th is rec'd, in answer your bills presented were ordered to be paid.

The object was to stop any further work under that resolution until some arrangement should be made by the parties outside of our fire corporation in this village where we are taxed independent of that section of the town for lights and fire purposes.

Yours truly,

ROYAL LEE, C. Clerk,

The Commissioners this day received, by the hands of a special messenger, the report of the committee appointed in accordance with a provision in the contract executed with George H. Corliss, February 8, 1872, to make a comparative test of the value of the engine furnished by said Corliss, for Hope Pumping Station, and the Worthington Duplex Engine, at Pettaconset. -The said report is dated 24th February, instant: a copy of it is hereunto appended. The Commissioners refrain in this report from making any comment on this document.

For convenience of reference in this connection, a copy of the agreement executed with Mr. Corliss is hereunto appended.

Plumbers' licenses have been issued to the following persons :

Thomas I. Hudson,

Alexander Lupton.

The whole number of Plumbers' licenses issued is forty-two.

The average daily consumption of water during the months of January and February, has been about 1,750,000 gallons.

The height of water in Sockanosset Reservoir at four o'clock this afternoon, was 180.32. High water in the reservoir is 180.50 (above high tide in Providence river).

Seventy-seven Ball and Fitts' water meters, made by the Union Water Meter Co., and twenty-seven Worthington water meters, have been put in at the expense of water takers since the date of the last report. Since the commencement, two five-eighths inch Ball and Fitts' water meters, burst by freezing, have been removed, and the parties now pay schedule rates.

There are twelve hundred and seventy-nine water meters now in use, viz :

1,001 five eighths inch.
161 three-quarters inch.
66 one inch.
41 one and one-half inch.
8 two inch.
2 four inch.

1,279

An error in the number of applications for a supply of water in the report of July 1, 1873, and continued through the two succeeding reports, has been corrected. The total number of applications is now four thousand four hundred and eight.

The number of service stops opened during the last two months is thirty-nine.

The total number of service stops opened to date is thirty-five hundred and fifty-four.

Fifty stops have been closed since the date of the last report for non-payment of bills, fifteen of which have been re-opened on payment of bills and a penalty in each case of two dollars.

Two stops closed for non-payment have been re-opened without charge, for reason of attendant circumstances. Six stops have been closed to enable the owners to set meters, there being no stop-cock on the premises, for five of which a charge of two dollars was paid at the time the request was made to have them closed, and one at the time of re-opening. Eleven stops have been closed by request, where a charge of two dollars has been paid, six of which have been re-opened. Thirty-eight stops closed for non-payment remain unopened. The use of two service pipes has been discontinued, but the pipes remain, in view of possible contingences.

Water is now supplied for the following uses:

6 bakeries; 30 banks; 49 bar-rooms; 1 bath house; 1 bath

house—Turkish ; 89 boarding houses ; 6 bottling establishments ; 28 building purposes ; 1 car house ; 2 carriage depositories ; 1 Christian Union ; 15 churches ; 1 city barn ; 1 city bridge, Point street ; 1 city building ; 5 city drinking fountains ; 14 city drinking troughs ; 728 city fire hydrants ; 9 city fire steamer stations ; 2 city hose houses ; 6 club rooms ; 12 coal yards ; 1 colored shelter ; 1 conservatory of music ; 2 convents ; 1 court house ; 1 decorator ; 1 Dexter Asylum ; 1,562 dwellings of one family ; 1,113 dwellings of two families ; 97 dwellings of three families ; 113 dwellings of four families ; 15 dwellings of five families ; 21 dwellings of six families ; 4 dwellings of seven families ; 4 dwellings of eight families ; 2 dye houses ; 3 elevators ; 2 engravers ; 1 express carriage house ; 38 fire supplies—private ; 41 fountains—private ; 1 fountain—public ; 1 furrier ; 1,998 garden and street hydrants ; 3 gas holders ; 5 gold and silver platers ; 5 gold and silver refiners ; 2 grain elevators ; 25 green houses ; 9 halls ; 1 hall of Latter-day Saints ; 1 Home for Aged Women ; 1 hospital ; 15 hotels ; 1 infirmary ; 1 lithographer ; 3 lodging houses ; 2 lumber dealers. *Manufacturing Establishments.*—2 belt and picker ; 3 blank book ; 2 bleacheries ; 1 bologna sausage ; 1 box ; 1 braiding works ; 2 brass foundries ; 1 brewery ; 1 brush ; 1 butt ; 6 carriage ; 2 cement pipe ; 1 chain ; 5 cigar ; 1 cigar box ; 4 cloak and dress ; 1 coffin ; 4 confectionery ; 1 corset ; 3 colorers of jewelry ; 7 cotton ; 1 crocus ; 1 distillery ; 3 die-sinkers ; 1 dye wood ; 1 emery wheel ; 1 enameled of jewelry ; 1 eyelet ; 2 file ; 6 furniture ; 1 gas ; 1 gas burner ; 3 gas fixtures ; 1 geer ; 1 hat ; 1 harness ; 1 horse shoe ; 2 ice cream and soda water ; 1 ink ; 1 iron company ; 1 iron fence ; 8 iron foundries ; 1 Japan switch ; 1 jewelers' cards ; 73 jewelry ; 4 lapidaries ; 17 machinists ; 1 mowing machine ; 1 nail keg ; 2 oil ; 1 organ ; 2 paper box ; 1 paper collar ; 2 paper cop tube ; 1 pattern ; 3 patent medicine ; 1 picture frame ; 2 pump ; 1 reed ; 1 rubber tubing ; 4 sash and blind ; 2 screw ; 1 sheet iron ; 2 shirt ; 2 silver ware ; 5 soap ; 1 spiral spring ; 1 starch ; 1 steam boiler ; 2 steam engines ; 1 stencil plate ; 1 stove ; 2

tanners; 1 thread; 1 tin; 4 tool; 2 top-roll; 5 woolen goods; 1 yeast. *Markets*.—30 fish; 71 meat. *Mills*.—2 drug and grain; 2 flour and grain; 5 marble works; 1 paint; 9 planing; 1. music hall; 1 nickel plater; 2 odd fellows' halls; 2 opera houses; 2 orphan asylums; 5 organs; 5 oyster houses; 436 offices; 5 photographers; 5 plaster and stucco workers; 4 plumbers; 5 police stations; 11 printing establishments; 9 provision curers and packers; 7 railroads; 1 reading room; 33 restaurants; 1 roofer. *Saloons*.—4 billiard; 3 bowling; 5 ice cream; 11 lager beer; 8 oyster. *Schools*.—1 boarding; 10 private; 27 public; 1 reform.—*Shops*.—21 barber; 6 blacksmith; 8 carpenter; 3 cooper; 1 junk; 6 paint; 1 painter; 5 shoemaker; 20 tailor; 5 tinman. *Stables*.—6 hack; 37 livery; 158 private; 2 sale; 51 work. 12 steam-boats; 13 steamships; 5 steam and gas pipe fitters. *Stores*.—1 agricultural implements; 30 apothecary; 1 auction; 4 book; 22 boot and shoe; 1 carpet; 1 carriage trimmings; 10 cigar; 16 clothing; 7 confectionery; 2 drug; 20 dry goods; 73 fancy goods; 7 flour and grain; 11 fruit; 8 furniture; 6 gents' furnishing goods; 80 grocery, retail; 14 grocery wholesale; 6 hardware; 2 hide and leather; 2 hoop skirt; 10 house furnishing goods; 2 house paper; 3 iron and steel; 9 jewelry; 10 liquor; 1 lime and brick; 2 manufacturers' supplies; 13 millinery; 8 newspaper; 3 oil and paint; 2 paper and paper stock; 6 produce, wholesale; 3 sewing machines; 3 stationery; 2 stove; 3 tea; 2 trunk; 1 umbrella; 1 wool; 2 woolen goods; 15 not classed. 1 store house; 2 undertakers; 1 United States Custom House building; 2 upholsterers; 2 water boats; 1 wheelwright; 1 wood turner; 3 wood yards.

The amount of expenditures during the last two months, is	\$113,451 09
The total amount of expenditures, is	3,201,512 64
The total amount of appropriations, is	3,400,000 00
The unexpended balance, is	198,487 36

The amount received during the last two months, all of which has been paid to the City Treasurer, is

For water supplies, . . .	\$73,035.66	
For water meters, . . .	2,876.50	
For penalties, . . .	64.00	
For sundries, . . .	10,929.45	
	<hr/>	\$86,905 61

The amount received for water in 1872, was	41,008 51
The amount received for water in 1873, was	97,386 09
The amount received for water during the first two months of 1874, is	73,035 66
The total amount received for water to date is,	211,425 26
The amount of all receipts to date, is	324,716 34

The Commissioners see no reason why any additional appropriation will be needed during the quarter next ensuing.

A schedule of bills approved during the last two months, and of receipts during the same time, and a trial balance of ledger, February 28, 1874, are hereunto appended, and made parts of this report.

A separate report of that portion of the duties of the Water Commissioners which relates to sewers, is presented herewith.

The undersigned, were elected 27th February instant, a Board of Water Commissioners, for the term of one year, from March 1, 1874, and until their successors are elected and qualified to act, unless an election of a Board of Public Works shall be sooner made; and have taken the oath of office.

JOSEPH J. COOKE,	}	<i>Water Commissioners.</i>
CHAS. E. CARPENTER,		
WILLIAM CORLISS,		

SCHEDULE OF BILLS APPROVED BY THE WATER COMMISSIONERS, FROM JANUARY 1, 1874, TO FEBRUARY 28, 1874, INCLUSIVE.

3930	Schooner Grace Cushing, freight of cast iron water pipes, (charged to Warren Foundry and Machine Co.,)	-	\$494 42
3931	Charles H. Parkhurst, counsel fees, - - -	-	400 00
3932	Calvin C. Campbell, rubble stone, - - -	-	1,035 00
3933	Lobdell & Newmans, on account for construction of Hope Reservoir, - - -	-	2,400 00
3934	Samuel M. Gray, paid by him for labor at Pettaconset, -	-	3,137 72
3935	Lobdell & Newmans, tools and extra labor at Hope Pumping Station, - - -	-	692 20
3936	Lobdell & Newmans, tools and extra labor at Hope Pumping Station, - - -	-	83 70
3937	Providence Gas Co., gas at Hope Engine House, -	-	250 70
3938	Earl Carpenter & Sons, ice, - - -	-	39 06
3939	Henry T. Root, feather duster, - - -	-	5 50
3940	Charles Warren Campbell, carting rubble stone, -	-	305 32
3941	Salisbury & Kinnecom, use of derrick, - - -	-	81 20
3942	W. N. Landerskin, labor, &c., at Pettaconset, -	-	228 96
3943	Freeborn & Crowell, " " Hope Engine House, -	-	138 06
3944	P. A. Conley, carting rubble stone, - - -	-	175 92
3945	Daniel F. Burlingame, repairing tools, &c., -	-	55 87
3946	Dexter Gorton & Co., carpenters' work, lumber, &c., -	-	862 14
3947	George B. & Willard F. Inman, laying water pipes, -	-	74 06
3948	" " " setting fire-hydrants, repairing streets, &c., - - -	-	193 18
3949	Samuel M. Gray, paid by him for labor at Hope Pumping Station, - - -	-	176 05
3950	George B. & Willard F. Inman, on account of reservation, -	-	1,500 00
3951	Schooner Fashion, freight of water pipes, (charged to Warren Foundry and Machine Co.,) - - -	-	205 72
3952	G. B. & W. F. Inman, on account of reservation, -	-	500 00
3953	Warren Foundry and Machine Co., cast iron water pipes, -	-	17,468 12
3954	Schooner Joseph Marsh, freight of water pipes, (charged to Warren Foundry and Machine Co.,) - - -	-	306 36
3955	Fuller Iron Works, special castings, - - -	-	889 04
3956	Builders' Iron Foundry, " " &c., - - -	-	93 70
3957	Hopkins & Pomroy, coal, cement, and carting brick, -	-	2,688 72
3958	Wood & Winsor, pipes, elbows, tees, labor, &c., -	-	47 54
3959	Thomas Phillips & Co., on account of tin lined lead pipe, laying service pipe, &c., - - -	-	525 00
3960	A. W. Page, tallow, - - -	-	44 12
3961	Olney Brothers, oil, - - -	-	90 07
3962	J. M. Schmid & Sons, repairing instruments, - - -	-	8 25
Amount carried forward, - - -			\$35,195 70

	Amount brought forward	-	-	-	\$35,195 70
3963	G. & S. Owen, repairing meter,	-	-	-	3 20
3964	W. A. Burdick, agent, granite,	-	-	-	1,944 00
3965	Manchester Bros., photographs,	-	-	-	136 75
3966	Wm. H. Miller & Co., tools, &c.,	-	-	-	21 87
3967	Barker, Whitaker & Co., tools, instruments, &c.,	-	-	-	471 65
3968	Fales, Jencks & Sons, fire hydrants, hydrant boxes, water gates, &c.,	-	-	-	6,125 35
3969	W. A. Burdick, agent, granite for engine house at Pettaconset,	-	-	-	3,675 00
3970	W. A. Burdick, agent, granite for Hope Engine House, retaining walls,	-	-	-	1,353 99
3971	Samuel M. Gray, on account for paying labor at Pettaconset,	-	-	-	200 00
3972	Thomas Phillips & Co., laying service pipes,	-	-	-	228 86
3973	" " " " " "	-	-	-	183 91
3974	Schooner Brandywine, freight of water pipes, (charged to Warren Foundry and Machine Co.,)	-	-	-	112 85
3975	Schooner Cynthia Jane, freight of water pipes, (charged to Warren Foundry and Machine Co.,)	-	-	-	49 23
3976	Charles H. Pierce, salary as assistant engineer,	-	-	-	250 00
3977	Samuel M. Gray, " " "	-	-	-	335 00
3978	Charles H. Swan, " " "	-	-	-	166 67
3979	Otis F. Clapp, " " "	-	-	-	208 33
3980	Howard A. Carson, " " "	-	-	-	208 33
3981	William T. Schneider, " " "	-	-	-	100 00
3982	C. Frank Allen, " " "	-	-	-	125 00
3983	John E. Bowen, " " "	-	-	-	100 00
3984	Lucius J. Sampson, " " "	-	-	-	83 33
3985	George H. Slade, " " "	-	-	-	83 33
3986	Daniel D. Waterman, " " "	-	-	-	66 67
3987	George F. Munro, " " "	-	-	-	83 33
3988	Lepriete Sweet, 2d, " " "	-	-	-	83 33
3989	Charles F. Janes, " service pipe engineer,	-	-	-	100 00
3990	Augustus F. Nagle, " mechanical " "	-	-	-	200 00
3991	Henry N. Francis, " student, engineering department,	-	-	-	41 67
3992	Edmund B. Weston, " " " "	-	-	-	41 67
3993	Walter R. Jackson, " " " "	-	-	-	33 33
3994	Edwin P. Dawley, " " " "	-	-	-	33 33
3995	Charles M. Hunt, " " " "	-	-	-	25 00
3996	Frank B. Ferris, " " " "	-	-	-	25 00
3997	Thomas L. Botts, " " " "	-	-	-	25 00
3998	William H. Olmstead, " " " "	-	-	-	25 00
3999	William M. Brown, Jr., " " " "	-	-	-	33 33
4000	Daniel C. Stone, " " " "	-	-	-	33 33
4001	Walter F. Slade, " service pipe clerk, engineering dep't.,	-	-	-	83 33
4002	William Aplin, " clerk, engineering department,	-	-	-	83 33
4003	William H. Turner, salary as clerk, engineering department,	-	-	-	100 00
4004	Irving H. Potter, " temporary office assistant, engineering department,	-	-	-	8 10
4005	Andrew B. Purdy, salary as superintendent of pipe work,	-	-	-	166 67
	Amount carried forward	-	-	-	\$52,653 77

REPORT OF THE WATER COMMISSIONERS.

15

	Amount brought forward,			\$52,653 77
4006	William H. Patterson, salary as inspector on pipe line,	-	8 00	
4007	S. Horace Wheeler, " " " of service pipes,	-	125 00	
4008	Samuel R. Eccleston, " " " of pipes,	-	135 00	
4009	Foster S. Dennis, Jr. " " " " "	-	84 00	
4010	Frederic A. Arnold, " " " " water fixtures,	-	83 33	
4011	Burrows Chace, " " " at Hope Reser-			
	voir,	-	115 00	
4012	Joseph P. Healy, salary as inspector on blow-off connection,	-	12 00	
4013	Henry G. Dennis " " superintendent of pipe yard,	-	125 00	
4014	Richard M. Wood, " " clerk at pipe yard,	-	66 67	
4015	Jeptha Baker, " " keeper of Sockanosset Reser-			
	voir,	-	77 50	
4016	George F. Battery, salary as pumping engineer,	-	100 00	
4017	John Hamilton, " " fireman,	-	80 00	
4018	George F. Barney, " " " " "	-	60 00	
4019	George H. DeForest, " " time keeper, &c., at Hope Reser-			
	voir,	-	87 30	
4020	William F. Tanner, salary as axeman, &c.,	-	58 60	
4021	John Murphy, " " " " "	-	44 70	
4022	Leonard N. Austin, Jr., salary as commissioners' clerk,	-	66 67	
4023	Thomas O. Gushee, " " " " "	-	83 33	
4024	Philip S. Chase, " " " " "	-	125 00	
4025	Clinton D. Sellew, " " secretary of water com-			
	missioners,	-	200 00	
4026	George F. Johnson, care of rooms,	-	57 90	
4027	Charles H. Pierce, paid by him for sundries,	-	47 17	
4028	" " " " " " labor at wharf, &c.,	-	600 00	
4029	Samuel M. Gray, horse hire and paid by him for sundries,	-	211 98	
4030	Bugbee & Hall, tracing cloth and drawing paper,	-	43 45	
4031	William S. Briggs, horse hire by committee to test engines,	-	45 00	
4032	M. D. Copeland, teaming,	-	33 00	
4033	" " " " "	-	54 38	
4034	William Elsbree, repairing streets, &c., (charged to Thomas			
	Phillips & Co., \$57.11.)	-	70 46	
4035	Stephen Knobb, carting granite, &c.,	-	16 23	
4036	W. J. Glover, felt,	-	12 96	
4037	National Rubber Co., labor on valves,	-	5 50	
4038	Ten Broeck & Riley, felting,	-	42 00	
4039	A. C. Eddy & Studleys, packing,	-	19 81	
4040	G. & C. P. Hutchins, gas fixtures, &c.,	-	14 35	
4041	W. Congdon & Sons, cabin hooks and cold chisels,	-	5 25	
4042	Charles F. Pope, wad cutters,	-	5 78	
4043	N. Webber, rubber boots,	-	31 50	
4044	Providence and Newport Lead Works, lead,	-	40 92	
4045	Boston Machine Co., water gate,	-	425 00	
4046	New England Butt Co., labor on patterns for drinking foun-			
	tains, &c.,	-	12 15	
4047	Charles H. Bradley & Co., matting,	-	17 78	
4048	John W. Mathewson & Co., granite,	-	3,442 96	
	Amount carried forward,	-	\$59,646 40	

	Amount brought forward,	-	-	-	\$59,646 40
4049	Union Water Meter Co., water meters,	-	-	-	1,775 85
4050	L. H. Humphreys, board, &c., of committee to test pump- ing engine, (one-half to be charged to George H. Corliss,)	-	-	-	581 55
4051	Thomas J. Hill, rent of wharf,	-	-	-	500 00
4052	Alva Carpenter, service plugs,	-	-	-	68 21
4053	William Whitaker, testing cement,	-	-	-	54 84
4054	Thomas R. Belcher, " "	-	-	-	12 90
4055	Albert E. Fuller, " "	-	-	-	16 00
4056	Lobdell & Newmans, on account of construction of Hope Reservoir,	-	-	-	4,350 00
4057	W. A. Burdick, Agent, granite,	-	-	-	1,890 00
4058	" " " " " "	-	-	-	5,225 00
4059	Samuel M. Gray, paid by him for labor at Pettaconset,	-	-	-	2,462 23
4060	" " " " " " " " Hope Pumping Station,	-	-	-	126 48
4061	Lobdell & Newmans, extra labor, &c.,	-	-	-	88 60
4062	Hopkins & Pomroy, coal, cement and stone,	-	-	-	1,748 43
4063	Wm. H. Miller & Co., repairing tools, &c.,	-	-	-	47 84
4064	Charles Warren Campbell, carting rubble stone,	-	-	-	391 27
4065	Hopkins & Pomroy, coal, &c.,	-	-	-	13 70
4066	A. J. Magoon & Co., use of stoves by committee to test pumping engines, (one-half to be charged to George H. Corliss,)	-	-	-	10 00
4067	F. Olds, adjusting and sealing scales,	-	-	-	7 50
4068	Proprietors of Locks and Canals on Merrimack River, time and expenses of assistants, testing pumping engines, one- half to be charged to George H. Corliss,)	-	-	-	303 57
4069	Schooner Fashion, freight of water pipes, (charged to War- ren Foundry and Machine Co.,)	-	-	-	193 53
4070	Fuller Iron Works, special castings,	-	-	-	850 50
4071	Builders' Iron Foundry, " "	-	-	-	176 40
4072	Daniel H. McCarty, damage,	-	-	-	20 00
4073	Warren Foundry and Machine Co., cast iron water pipes,	-	-	-	17,694 46
4074	Samuel M. Gray, on account of payment for labor at Petta- conset,	-	-	-	200 00
4075	T. & W. Breck, rent of offices, &c.,	-	-	-	752 50
4076	Hopkins & Sears, board &c., of assistants testing pumping engines, (one-half to be charged to George H. Corliss,)	-	-	-	407 50
4077	Thomas Phillips & Co., laying service pipes,	-	-	-	54 85
4078	Schooner Brazos, freight of water pipes, (charged to War- ren Foundry and Machine Co.,)	-	-	-	254 79
4079	Charles H. Pierce, salary as assistant engineer,	-	-	-	250 00
4080	Samuel M. Gray, " " " " &c.,	-	-	-	335 00
4081	Charles H. Swan, " " " " "	-	-	-	166 67
4082	Otis F. Clapp, " " " " "	-	-	-	208 33
4083	Howard A. Carson, " " " " "	-	-	-	208 33
4084	William T. Schneider, salary as assistant engineer,	-	-	-	100 00
4085	C. Frank Allen, " " " " "	-	-	-	125 00
4086	John E. Bowen, " " " " "	-	-	-	100 00
	Amount carried forward,	-	-	-	\$101,418 13

REPORT OF THE WATER COMMISSIONERS.

17

Amount brought forward,		-	-	-	\$101,418 13
4087	Lucius J. Sampson,	salary as assistant engineer,	-	-	83 33
4088	George H. Slade,	" " " "	-	-	83 33
4089	Daniel D. Waterman,	" " " "	-	-	66 67
4090	George F. Munro,	" " " "	-	-	83 83
4091	Lepilete Sweet, 2d,	" " " "	-	-	83 33
4092	Charles F. Jones,	" " service pipe engineer,	-	-	100 00
4093	Augustus F. Nagle,	" " mechanical "	-	-	200 00
4094	Henry N. Francis,	" " student, engineering department,	-	-	41 67
4095	Edmund B. Weston,	salary as student, engineering department,	-	-	41 67
4096	Walter R. Jackson,	salary as student, engineering department,	-	-	33 33
4097	Edwin P. Dawley,	salary as student engineering department,	-	-	33 33
4098	Charles M. Hunt,	" " " "	-	-	25 00
4099	Frank B. Ferris,	" " " "	-	-	25 00
4100	Thomas L. Botts,	" " " "	-	-	25 00
4101	Wm. H. Olmstead,	" " " "	-	-	25 00
4102	Wm. M. Brown, Jr.,	" " " "	-	-	41 67
4103	Daniel C. Stone,	" " " "	-	-	33 88
4104	Walter F. Slade,	" " service pipe clerk, engineering department,	-	-	83 33
4105	William Apln,	salary as clerk, engineering department,	-	-	83 88
4106	William H. Turner,	" " " "	-	-	100 00
4107	Andrew B. Purdy,	" " 'superintendent of pipe work,	-	-	166 67
4108	B. Horace Wheeler,	" " inspector of service pipes,	-	-	125 00
4109	Henry M. Wilcox,	" " assistant inspector of service pipes,	-	-	12 00
4110	Samuel R. Eccleston,	salary as inspector of pipes,	-	-	120 00
4111	Foster S. Dennis, Jr.,	" " " "	-	-	96 00
4112	Frederic A. Arnold,	" " " " water fixtures,	-	-	83 33
4113	Burrows Chase,	" " " at Hope Reservoir, &c.,	-	-	143 00
4114	Henry G. Dennis,	" " superintendent of pipe yard,	-	-	125 00
4115	Richard M. Wood,	" " clerk at " "	-	-	66 67
4116	Jeptha Baker,	salary as keeper of Sockanosset Reservoir,	-	-	77 50
4117	George F. Battery,	salary as pumping engineer,	-	-	100 00
4118	John Hamilton,	" " fireman,	-	-	80 00
4119	George F. Barney,	" " " "	-	-	60 00
4120	George H. DeForest,	salary as time keeper, &c.,	-	-	85 80
4121	William F. Tanner,	" " axeman,	-	-	48 60
4122	Leonard N. Austin, Jr.,	" " commissioners' clerk,	-	-	66 67
4123	Thomas C. Gushee,	" " " "	-	-	83 33
4124	Philip S. Chase,	" " " "	-	-	125 00
4125	Clinton D. Sellew,	" " secretary of water commissioners,	-	-	200 00
4126	Joseph J. Cooke,	salary as water commissioner,	-	-	333 33
4127	Charles E. Carpenter,	salary as water commissioner,	-	-	333 33
4128	William Corliss,	" " " "	-	-	333 33
4129	George F. Johnson,	care of rooms,	-	-	52 56

Amount carried forward, - - - \$103,626 90

	Amount brought forward,	-	-	-	105,626 90
4130	Charles H. Pierce, paid by him for sundries,	-	-	-	31 38
4131	" " " paid by him for labor at wharf,	-	-	-	624 00
4132	Samuel M. Gray, horse hire, &c.,	-	-	-	134.73
4133	Knowles, Anthony & Danielson, advertising,	-	-	-	19 12
4134	Akerman & Co., binding "Engineering," &c.,	-	-	-	21 75
4135	George W. Harris, painting signs,	-	-	-	18 85
4136	Henry Staples & Co., manilla paper and bags,	-	-	-	4 18
4137	City of Providence, Fire Department, hose,	-	-	-	187 50
4138	Samuel R. Eccleston, expenses from Phillipsburg, N. J., postage, &c.,	-	-	-	14 05
4139	S. C. Tillinghast, plank,	-	-	-	7 50
4140	American Steam Gauge Co., use of test pump, testing pump- ing engine, (one-half to be charged to George H. Corliss,)	-	-	-	25 00
4141	M. D. Copeland, teaming,	-	-	-	29 45
4142	Henry R. Worthington, repairing Worthington engine,	-	-	-	960 53
4143	Allen Fire Department Supply Co., street sprinklers, repair- ing street sprinklers, &c.,	-	-	-	364 25
4144	Daniel F. Burlingame, sharpening stone tools, &c.,	-	-	-	39 85
4145	Thomas Phillips & Co., repairing meters,	-	-	-	59 23
4146	" " " " laying service pipes,	-	-	-	5 58
4147	Wm. H. Fenner & Co., ash barrels, pump, carting and re- pairing stoves, &c.,	-	-	-	30 86
4148	Fales, Jenks & Sons, hydrant boxes, water gates, &c.,	-	-	-	3,357 30
4149	Dexter Gorton & Co., carpenter's work, &c.,	-	-	-	99 42
4150	" " " " " " " " lumber, &c.,	-	-	-	457 15
4151	J. Herbert Shedd, salary as Chief Engineer,	-	-	-	1,333 33
					<hr/>
					\$113,451 90

RECEIVED FROM JANUARY 1, 1874, TO FEBRUARY 28, 1874, IN-
CLUSIVE, AND PAID TO THE CITY TREASURER.

1874.

January	1. Of Builders' Iron Foundry, for labor and materials, -	\$232 92
"	8. Of Stafford & Co., for six months' rent of Pawtuxet Mill, to January 1, 1874, - - -	400 00
"	8. Of C. B. Sawyer, for repairing sidewalk over service pipe, -	1 25
"	8. Of Providence Gas Co., for labor and materials, -	1,093 09
"	12. John Godfrey, for three months' rent of farm in War- wick, purchased of Miss Patience W. Chace, to April 8, 1874, -	43 75
"	15. Of Alfred Mundell, for valve covers, &c., -	19 37
"	15. Of Samuel M. Gray, for sundries, -	7 50
"	15. Of H. B. Leach & Sons, for repairing service pipes, -	5 04
"	20. Of P. & J. Tierney, for repairing sidewalk over service pipe, -	65
"	23. Of City of Providence, for sewer expenses, -	2,928 26
"	23. Of Providence & Worcester Railroad Co., for labor and materials, - - -	123 17
"	26. Of Oren A. Ballou, for labor and materials, -	238 74
"	29. Of Town of Cranston, for work on Reservoir avenue, -	5,000 00
February	7. Of Olney Brothers, for error in payment of bill, -	76 27
"	16. Of Henry W. Wilkinson, for labor and materials, -	184 43
"	18. Of Fuller Iron Works, for old iron, -	272 80
"	25. Of Francis McGrath, for repairing water pipe, -	4 96
"	26. Of City of Providence, for sewer expenses, -	164 50
"	28. Of Greenwich Print Works, for cast iron water pipe, -	126 75
	For stops permanently closed during the two months, -	6 00
	For water during the two months, -	73,035 66
	For meters " " -	2,876 50
	For penalties " " -	64 00
		<hr/>
		\$86,905 61

TRIAL BALANCE OF LEDGER, FEBRUARY 28, 1874.

	Dr.	
Hope Reservoir, for land,	\$194,122 80	
" " " sundries,	748 28	
" " " labor,	1,582 62	
" " " gate chambers,	3,745 53	
" " " drain,	404 08	
" " " inspection,	2,356 89	
" " " conduit,	2,498 00	
" " " slope wall,	155 06	
" engine house,	101,664 81	
" " " for lights,	309 58	
" pumping station, for coal and wood,	1,047 46	
" " " " sundries,	271 46	
Night and Sunday watch at Hope engine house,	41 23	
Sockanosset Reservoir, for construction,	177,870 72	
" " " sundries,	4,068 48	
" " " land,	16,074 35	
" " " watch,	1,964 25	
" " " gate houses,	18,585 57	
" " " drain,	2,429 30	
" " " inspection,	6,819 18	
" " " extra work and materials,	189 70	
" " " gate chambers,	19,299 27	
Line of leading mains, for labor and materials,	19,808 52	
" " " " extra trenching, etc.,	305 95	
" " " " land and damages,	1,665 00	
Force main line, for land and damages,	3,006 35	
" " " " labor and materials,	5,099 28	
" " " " extra trenching, etc.,	892 56	
Office furniture, stoves, gas fixtures, etc.,	1,312 21	
Rent of offices,	3,450 00	
Books, stationery, etc.,	841 45	
Fuel and lights,	255 55	
Horse-hire by commissioners,	19 00	
Janitor of rooms,	599 00	
Traveling expenses of commissioners,	122 62	
Clerks' salaries,	6,359 51	
Commissioners' salaries,	26,708 78	
Secretary's salary,	3,765 71	
Sundries,	461 83	
Printing,	2,042 57	
Advertising,	1,684 62	
Fences,	2,050 38	
Stop valves,	58,311 72	
Store house and work shop,	1,307 38	
Rent of wharves and pipe yards,	4,290 94	
Linking curved pipes,	232 75	
Tools,	8,742 38	
Amount carried forward,	\$638,745 58	

REPORT OF THE WATER COMMISSIONERS.

21

Amount brought forward,	\$688,745 58
Labor on pipes,	14,569 84
Cast iron water pipes,	1,072,068 12
Special castings,	85,098 97
Lumber,	1,455 71
Fire hydrants,	98,152 27
Sockanosset hill cross road,	3,855 28
Pettaconset and Sockanosset telegraph line,	1,758 01
Dwelling houses at Pettaconset,	9,547 96
Culverts and bridge on line of force mains,	6,775 83
Culverts at Pettaconset,	3,557 93
Real estate in Warwick,	12,118 04
Water privileges, mill and other real estate in Pawtuxet,	50,221 96
Pochasset bridge,	5,559 82
Wharf salaries,	6,732 78
Temporary engine house at Pettaconset,	9,354 69
Roads, slopes, etc., at Pettaconset,	11,454 22
Engine house at Pettaconset,	140,428 09
Natural filter basin,	83,094 50
Removing loam,	462 96
Iron screw piles,	3,766 46
Hydrant bolts,	1,494 29
Pipe bolts,	1,496 45
Photographs,	284 25
Hydrant heads,	7,448 00
Taps and stops,	13,998 34
Valve covers,	7,412 26
Service pipe,	25,144 82
Hydrant boxes,	26,197 41
Setting fire hydrants,	9,199 84
Valve boxes,	26,404 97
Check valves,	1,413 48
Air cocks, boxes, cover and setting,	500 05
Night and Sunday wat at engine house,	1,355 60
Pettaconsett Pumping station, for sundries,	2,948 17
" " engineer,	3,398 28
" " coal and wood,	21,918 66
" " labor on fuel,	1,318 85
" " firemen,	3,397 08
" " land,	26,886 17
Setting blow-offs,	295 66
Ascertaining and removing nuisances on Pawtuxet river,	479 46
Providence Steam and Gas Pipe Co.,	2 00
Rhode Island Concrete Co.,	150 00
Henry R. Worthington,	18 49
Lobdell & Newmans,	50,400 00
A. & W. Sprague Manufacturing Co.,	2,500 00
Thomas Phillips & Co.,	5,875 09
City of Providence, fountain, Abbott Park,	707 07
Fall River Iron Works Co.,	1 00
David Cady & Co.,	2 27
City of Providence, Sewer Department,	8,581 25
Samuel M. Gray,	200 00
W. A. Burdick, Agent,	27,000 19
Thomas Pearson,	136 79
Amount carried forward,	\$2,422,722 25

Amount brought forward,	\$2,488,723 85
Daniel Holmes,	3 66
Union Water Meter Co.,	30 63
Albert Weaver,	1 50
M. J. Higgins,	50
City Treasurer,	118,291 08
“ “ for water payments,	211,425 26
Testing pipe iron,	443 50
Iron drain pipes and gate,	224 21
Carting pipes,	29,545 51
Counsel fees,	4,600 00
Inspection of pipes,	8,416 61
Inspection of water fixtures,	1,996 78
Testing bolts and composition castings,	84 25
Laying water pipes,	330,931 67
Laying service pipes,	22,285 22
Laying suction pipe, etc.,	85 00
Drainage pump and engine,	4,950 96
Hydrants for street sprinklers,	1,928 63
Inspection of pipe laying,	22,271 90
Temporary boarding house at Pettaconset,	1,340 04
Public drinking fountains and troughs,	709 12
Expense of testing engines,	2,575 21
Water meters,	37,735 81
Water meters set, belonging to the city,	644 00
Worthington Pumping Engine,	39,048 30
Miller boilers at Pettaconset,	93 34

\$3,318,317 99

ENGINEERING DEPARTMENT.—

For instruments,	\$2,724 35
Tools,	665 35
Furniture, stoves, gas fixtures, etc.,	2,469 48
Books, stationery, etc.,	2,558 86
Draughting,	3,323 52
Labor,	5,227 25
Horse and wagon account,	1,492 72
Horse keeping, shoeing, etc.,	1,346 70
Horse hire,	3,470 40
Rent of offices,	6,290 61
Fuel and lights,	635 06
Janitor of rooms,	1,191 04
Experimental filter,	91 08
Sundries,	2,355 27
Test wells,	1,579 40
Consultations,	827 08
Office Building at Pettaconset,	553 21
“ “ “ Sockanosset Reservoir,	568 22
Stakes and strips,	704 21
Printing,	418 96
Maps,	86 67
Service pipe experiments,	295 76
Temporary assistance,	6,943 07
Salaries,	107,122 26

153,126 22

Amount carried forward,

\$3,471,254 22

REPORT OF THE WATER COMMISSIONERS.

23

Amount brought forward,

\$3,471,354 22

Cr.

Hope Reservoir, for land, (rents received and buildings, etc., sold,)	\$5,883 28
Sockanosset Reservoir, for land, (rents received and wood, etc., sold,)	1,584 49
Real estate in Warwick, (rents received,)	975 00
Pettaconset Pumping Station, for land, (rents received,)	487 89
Water privileges, mill and other real estate in Pawtuxet, (rents received,)	3,339 53
J. B. & J. M. Cornell,	1,000 00
Warren Foundry and Machine Co.,	4,001 68
G. B. & W. F. Inman,	2,500 00
Interest,	54 66
Boston hydrants,	28 39
Water meters,	33,466 00
Penalties,	146 00
Water,	211,425 36
Approved bills,	3,301,512 64

\$3,471,354 22

REPORT OF COMMITTEE TO TEST PUMPING ENGINES.

JOSEPH J. COOKE,
CHARLES E. CARPENTER, } *Water Commissioners, Providence, R. I.*
WILLIAM CORLISS,

GENTLEMEN:—The undersigned committee, appointed under the conditions named in a certain agreement made by your board, with Mr. George H. Corliss, for furnishing and erecting a pumping engine and appurtenances, for use at "Hope Station," to supply the high service of the city, have concluded the necessary investigations and tests of the engine referred to, also the one situate at Pettaconset, and beg leave to make the following report of the facts obtained by their labors, and the conclusions which they deduce therefrom:

Your committee were very much embarrassed by the difficulty of making close, accurate comparisons of the two engines to be tested.

They are totally different in design, construction and situation; were built for, and are now performing, entirely dissimilar daily work.

The Hope Engine is designed for the performance of a peculiar and special duty, namely: supplying an almost constantly varying demand for water, which demand has to be met by pumping directly into the distributing mains of the city without the intervention of either reservoir or stand-pipe.

The call upon it may be increased at a few minutes notice, from its minimum capacity and rate of speed, to the maximum of its power and velocity.

This engine receives its supply through the mains of the low service, the water reaching the pumps under a head or back pressure on the suction side varying within the limits of about forty feet.

The height to which the water is raised averages about eighty eight feet.

The Pettaconset Engine was designed for, and is now employed, raising the water into a reservoir, about one hundred and eighty feet above average surface of the water in the river.

Its speed is not required to be variable, and has, therefore, no adjustable arrangements to adapt it to such changeable conditions as exist at the Hope Engine; it is usually raising, as nearly as possible, at the rate of five million gallons per day, of 24 hours; it has to draw the supply of water through a suction pipe, of considerable length, to a vertical height of about fifteen and one-half feet.

From this it will be seen in what essential particulars the circumstances differ, and how very unlike the duty to be performed. It appeared from your view of the case and the opinion of the builder of the Hope Engine, that the intention of the agreement was, that in making the comparative tests of the two engines, the Pettaconset Engine should be brought as nearly as possible to the average capacity of the Hope Engine, both in regard to the height to which the water was raised and the quantity to be lifted daily.

This latter is assumed by the construction put upon the agreement to be two million gallons in twenty-four hours.

Your committee, recognizing the serious nature of these discrepancies, anxious to make the investigations as nearly identical as possible, proceeded with the tests in the manner detailed below :—

The ascending mains in both cases were cut off and capped at a point just beyond the nearest branch pipe, through which the water lifted by the pumps was discharged over a notch weir, care being taken that no water could flow over the weir, except what had passed through the pumps—the discharge at the branch being so regulated by the adjustment of a stop gate placed upon it, that the head pressure against the pumps represented the height to which the water was to be raised per agreement, the same gate serving to keep the quantity discharged per day within the prescribed limits.

The tests were continued for forty-eight consecutive hours, for the purpose of reducing any possible error in estimating the condition of the fires at the commencement and termination of the tests, to a minimum, or rather dividing such error, if any existed, over as long an interval of time as convenient.

The water discharged by the pumps over the weir, was estimated from the observations of the depth flowing over it; these were made by Col. James Francis and Mr. Wm. S. Southworth, gentlemen who have had much experience in this method of measuring the flow of water. They were made at very short intervals, and the results accurately calculated, by the well-known formula of Mr. James B. Francis, of Lowell, now universally acknowledged to be the most reliable in use. The weir observations were made for twenty-four hours only, in each case, that being considered long enough to obtain the desired results. All the pressure gauges upon the boilers, engines and pumps, were tested with care both before and after the trials, by a standard gauge and test pump. (kindly loaned us, by the American Steam Gauge Company,) and their error, if any, corrected, upon the readings of the gauges employed.

The scales used for weighing the coal, were examined and sealed by the "Sealer of weights and measures," at the commencement of the tests, and they were also frequently tried during the run by weights left us for the purpose.

REPORT OF COMMITTEE TO TEST PUMPING ENGINES. iii

The pump heads were removed and the pistons and plungers accurately measured.

In order that the coal used for both engines should be as nearly as possible similar in quality and size, alternate loads were taken from the same coal bin, at the yard of the merchant supplying it, first to the Hope and then to the Pettaconset Station; which coal was carefully kept separate from any other at the works, and used exclusively during the tests.

The coal was not selected for any supposed superior quality, and was consumed just as it came from the yard, without screening, picking or other special preparation.

The engines and boilers, in both cases, were taken just as they were found, without any cleaning or other preparation, both being in actual use, supplying the city with water, up to the time that their respective mains were cut and the tests started.

For reasons not necessary to mention here, no measurement was made of the feed water supplied to the boilers, consequently their evaporative power was not obtained.

The method of conducting the tests was as follows: The engines were run until the boilers required fuel, the depth of coal upon the grates was then measured, the intensity of the fires carefully observed, the water level in the glass tubes upon the boiler measured and the test then begun; when terminated, the fires had reached about the same depth and activity as at the start, and the water in the boilers about the same level as at the commencement.

During the tests the indications of pressure upon all the steam and water gauges employed, were noted every half hour; the number of strokes ascertained from the engine counter were frequently confirmed by actual counting

All the observations were made by at least two of our number jointly, and recorded in a book kept for the purpose. The duty test of the Hope Engine when running at the rate of 2,000,000 gallons per day, was commenced Thursday, January 8th, 1874, at 3 o'clock, 30 minutes, P. M., and continued until Saturday, Jan. 10, 1874, at four o'clock, P. M.

Duration of test, 48 hours 30 minutes.

Average height pumped, 88.2882 feet.

Average gallons raised per minute, 1,424.7 gallons.

Average gallons raised per hour, 85,482 gallons.

Total gallons raised during the run, 4,145,877 gallons.

Gallons raised at same rate per 24 hours, 2,051,568 gallons.

Gallons, full capacity of pump, rate per

first 24 hours run, 2,064,535 gallons.

Gallons flowing over the weir, rate per first 24 hours, 1,994,992 gallons.

Per centage of lost action of pump, 3.36 per cent.

Gallons actually raised, making deductions for lost action of pump, rate per first 24 hours run, ..	1,982,636	gallons.
Coal consumed, per minute.....	4.02	pounds.
“ “ hour.....	241.2	“
Total coal consumed during the run.....	11,700	“
Ashes dropped through the grates.....	1,028	“
Gallons raised with one pound of coal, full content of the pump.....	354.4	gallons.
Actual gallons raised with one pound of coal.	342.49	“
Cost of coal per annum, at contract price, when raising 2,000,000 gallons per 24 hours.....	\$7,352	(10)
Length of stroke	30	inches.
Average revolutions per minute.....	10.167	“
Temperature of water at the time.....	41.0	degrees.
Weight of one gallon at that temperature.....	8.326	pounds.
Duty, calculating resistance against the pump, ascertained by pressure gauges	25,865,740	ft. lbs.
Duty, actual water delivered at the temperature named.....	25,176,384	ft. lbs.

The engine worked well, though with considerable noise, from lost motion, upon all the main connecting rods. At the comparatively slow motion of the run, but little shock was felt upon the pumps. At the termination of the test, a short run was attempted, in order, if possible, to obtain a weir measurement, while running at the rate of 5,000,000 gallons per twenty-four hours, before the removal of the weir to Pettaconset Station. This was, however, found impracticable, on account of the small size of the weir box, and its consequent overflow after the discharge reached the rate of about 4,000,000 gallons per day.

The test of the Pettaconset Engine was commenced Thursday, January 20, 1874, at 3 o'clock 30 minutes, P. M., and continued until the same hour, January 22, or 48 hours. The summary of this test is as follows:

Duration of test.....	48	hours.
Average height pumped.....	87.9778	feet.
Gallons raised per minute, average.....	1,383,778	gallons.
“ “ hour “	83,026.68	“
Total gallons raised during the run.....	3,985,280	“
Gallons raised at same rate per 24 hours.....	1,992,640	“
“ full capacity of pump, rate per first 24 hours of the run.....	2,087,394	“
Gallons flowing over the weir, rate per first 24 hours of the run.....	2,034,882	“
Per centage of lost action of pump.....	2.51	per ct.
Gallons actually raised, making deduction for lost action of pump, rate per first 24 hours.....	1,942,623	gallons.

REPORT OF COMMITTEE TO TEST PUMPING ENGINES. V

Coal consumed per minute.....	1.9569 pounds.
“ “ hour.....	117.416 “
Total coal during the run....	5,636 “
Ashes dropped through the grates....	486 “
Gallons raised with one pound of coal, full contents of the pump.....	707.11 gallons.
Actual gallons raised with one pound of coal.....	689.37 “
Cost of coal per annum, at contract price, when raising 2,000,000 gallons per 24 hours	\$3,680.00
Length of stroke.....	46.7342 inches.
Average strokes per minute.....	18.276 strokes.
Temperature of water at the time.....	32 degrees.
Weight of one gallon of water at that temperature.	8.3383 pounds.
Duty, calculating resistance against the pump, ascer- tained by pressure gauges.....	53,528 210 ft. lbs.
Duty, actual water delivered at the temperature named.....	50,574,955 ft. lbs.

This engine being adapted for pumping 5,000,000 gallons per day 180 ft. high, of course suffered materially, when its work was forced to conform to the Hope Engine, and the quantity reduced to 2,000,000 gallons per day, 88 ft. high.

To those familiar with the subject this must be evident, as the radiation and other causes of loss are the same (or nearly so), when pumping the limited quantity to the minimum height, as when raising the larger quantity, to the maximum lift.

Your committee are therefore satisfied that the duty performed in this case, namely, 53,528,210 feet pounds raised one foot high with one hundred pounds of coal, cannot be taken as a standard of its economic performance when working up to the capacity for which it was designed and adapted; if then tested, its duty would be of the very highest order.

The engine at Pettaconset was also run at speeds varying from the slowest, to that necessary to produce 5,000,000 gallons per day, and the reverse.

This was done by opening and shutting the stop upon the discharge branch, the intention being to simulate the effect produced by opening and closing fire hydrants, as in case of fire.

As this engine does not require any automatic adjustments while doing its ordinary work, none are provided; the regulation of the throttle valve and injection had therefore to be made by hand. The engine, however, increased and diminished its speed a number of times within the limits named, and conformed to the varying requirements made upon it promptly, smoothly and without trouble.

All the tests upon this engine were made while using but one boiler, so that its condition might to some extent approach that of Hope Sta-

tion. It may, however, be stated that the relative heating surface, when running at the rate of 5,000,000 gallons is much less than that of the Hope Engine, when working at the same capacity.

The speed of the engine and steam pressure in the boiler during this test were remarkably regular, notwithstanding the limited amount of heating surface employed, compared with the work done.

During all the tests it worked with great precision and smoothness, almost noiselessly, even at the highest rate of speed, no shock was apparent, and no expansion or contraction of the pump chamber noticeable.

The daily work of the Pettaconset Engine is to raise water 180 ft., vertical height, into a reservoir through a main 5,736 ft. long, part of 24 and part of 36 inch diameter.

The Hope Engine, owing to the peculiar work that it is called upon to perform, labors under very serious disadvantages, particularly in regard to the question of economy in consumption of fuel.

The boiler employed must be entirely capable of supplying steam freely for a capacity of 5,000,000 gallons per day, if required, as in case of extensive conflagration in the district supplied by it, or for other extraordinary demand; it is therefore too large to supply the engine with economy, when running at the rate of 2,000,000 gallons; this also applies to the steam cylinders, but more particularly is this the case, when it is supplying the present very limited quantity required for the wants of the inhabitants, namely, about 175,000 gallons per day.

The next test of the Hope Engine was to ascertain its "adaptability," (or rather, adaptation) "to the particular service required," and to test the working of the automatic appliances designed to fit it to that service. Accordingly, the Chief Engineer of the Fire Department, was instructed to give an alarm of fire at a time fixed by himself, and unknown to us, or the employees in the engine house, and then to attach hose to the fire hydrants, as though a conflagration actually existed, and subsequently, to shut them off, precisely in the manner they would be closed after a fire had been extinguished.

The engine adapted its motion to the varying conditions required.

The appliances for producing this result, while not entirely new in principle, are ingeniously contrived and carried out.

Another trial was commenced, at a later period, with the same object, and to prove its capacity to raise at the rate of 5,000,000 gallons per day, for a period of ten consecutive hours, which was entirely successful, until the mains of the low service failed to supply the full quantity of water, and the head was drawn down so low that air was admitted into the pumps.

This deficiency of water occurred at or near midnight, when it is reasonable to suppose the supply would be increased by the dimin-

REPORT OF COMMITTEE TO TEST PUMPING ENGINES. vii

ished demand made by the inhabitants, taking water from the low service—the cause is unaccountable to us.

In this trial sufficient opportunity was afforded to convince the committee, that within the limits prescribed by the agreement, the automatic apparatus is available.

Experiments were made with both engines to ascertain their capacity to pump at the rate of 5,000,000 gallons per day,—no account of fuel was taken, as it was considered the agreement only required a commercial duty test, at the average quantity of 2,000,000 gallons.

Your committee are satisfied that the engines and boilers at both stations have the necessary capacity for raising 5,000,000 gallons per day.

The noise produced on the Hope Engine by the lost motion upon the connecting rod pins, when at the highest speed, was disagreeable and excessive;—a visible expansion and contraction of the flat surface of the sides of the pumps, at each alternation of the pistons, was noticed.

The shock produced by each individual pump could be distinctly felt and counted upon the fire hydrants and stops upon the mains at considerable distance from the Engine House.

In addition to the experiments already mentioned, a duty trial was made of the Hope Engine, at its present slow rate of speed and of the Pettaconset Engine at the slowest speed it could be run, as at present constructed.

The result of these trials will be found in the following summary :

Summary of the test of the Hope Engine while running at its ordinary rate of speed, Jan. 24 to 25, 1874.

Duration of trial,	24 hours.
Average height to which the water was raised,.....	83.16 ft.
{ Total number of gallons raised during test,.....	174,747
{ Total number of gallons raised per day of 24 hours.....	174,747
{ Both calculating the full content of pump as raised.	
Total coal during run,.....	1,427 lbs.
Total coal per 24 hours,.....	1,427 lbs.
Number of pounds of water raised with one pound of coal, full content of pump calculated.....	122.44 lbs.
Duty in feet pounds, resistance against the plunger, as ascertained by pressure gauges,.....	8,487,370 ft. lbs.
Cost of coal per annum, at contract price, when raised 174,747 gallons per day of 24 hours,.....	\$5,208.58
Revolutions per minute, average, .....	.0866 revolutions
Lost action of pump assumed to be,.....	.336 per cent.

Summary of test of Pettaconset Engine, while running at its slowest speed, Jan. 31st, 1874:

Duration of trial,.....	10 hours 15 m.
Average height to which the water was raised.....	88.223 feet.
{ Total number of gallons raised during test,.....	344,193 gals.
{ Total number of gallons raised per day,.....	805,917 "
{ Full content of pump calculated as raised.	
Total coal burned during the run,.....	705 pounds.
Total coal burned during 24 hours.....	1,426.75 pounds.
Number of pounds water raised with one pound	
of coal, full content pump,.....	488.21 pounds.
Duty in feet pounds per pressure gauge resistance	
against plunger,.....	36,878,346.
Cost of coal per annum, at contract price, raising	
at the rate of 174,747 gallons per day, being	
same quantity as Hope Engine raised	\$1,877.50
Cost of coal per annum, raising at the rate of 805,-	
917 gallons per day,.....	\$2,573.25
Average strokes per minute,.....	7.81 strokes.
Average length of stroke,.....	44.332 inches.
Lost action of pump, assumed to be.....	2.51 per cent.
As this engine has to raise the water to a vertical height of between 15 and 16 ft. through a suction main of about 90 feet in length, with a foot valve at its lower end, an addition of one pound pressure has been made to compensate for friction, &c., &c., &c.	

Summary of test of Hope Engine while running at the rate of 5,000,-000 gallons per 24 hours, Jan. 29, 1874 :

Duration of test,.....	5 hours 45 min.
Height to which the water was pumped.....	116.174 feet.
Total gallons during the run, full content of pump	
calculated,.....	1,123.050 galls.
Pumped at the rate, for 24 hours.....	4,687,516 "
Average revolutions per minute,.....	23.23 revolutions.

Summary of test of Pettaconset Engine while running at the rate of 5,000,000 gallons per 24 hours, Jan. 30th, 1874:

Duration of test,	5 hours.
Height to which the water was pumped,	120.299 feet.
Total gallons during the run, full content of pump	
calculated	1,097,535 galls.
Pumped at the rate for 24 hours,.....	5,268,168 "
Average strokes per minute,.....	47.49 strokes.
Average length of stroke,	47.33 inches.

Indicator cards were taken during the tests of both engines, from the steam cylinder and pumps, for the purpose of detecting any defective action which might otherwise escape notice.

REPORT OF COMMITTEE TO TEST PUMPING ENGINES. ix

Inspection of the several summaries given in this report, will exhibit details of all the experiments made.

With regard to the cost of attendance and supplies, (except coal), immunity from accident and need of repairs, little or no essential difference appeared to exist between the engines, and consequently no comparative money value has been estimated.

Both Engines are remarkably good specimens of workmanship and with the exception already named, (the strength of the flat sides of the pump attached to the Hope Engine,) a very liberal amount of material of good quality and finish has been furnished.

Your committee consider that the contractor is entitled to receive, for the work performed, the sum stated in the agreement, namely: thirty-four thousand dollars.

Upon the question of extra compensation, your committee do not agree, as will be seen by the additional reports given below.

ERASTUS W. SMITH,
FRED'C. GRAFF,
GEO. H. REYNOLDS.

Your committee are required by the contract to fix a money value for the essential points considered. The principal of these—in our opinion—is the great range of capacity and “special adaptation” of the Hope Engine to the peculiar duty of the high service station; where, while satisfying the very small demand of the upper service district, now less than two hundred thousand gallons per twenty-four hours, it may, within a few minutes, should emergency demand it, perform the duty of a Leviathan Stationary Fire Engine and supply at the rate of five million gallons in the same time with undiminished force; in the former case the engine making, say, one-half of one revolution per minute, and in the latter, about twenty-seven; the acceleration being more than fifty times, and the automatic appliances regulating the movement of the engine at and between these great attendant variations. During the trial the Hope Engine exhibited a capability to work at the rate of only one quarter of one revolution per minute.

The duty of the Pettaconset Engine, the particular engine to which we have been limited by the contract in making our comparisons, does not require such special arrangement and adaptation, and none have been provided.

The above mentioned features of the Hope Engine we regard as possessing special merit; and we affix as our estimate of the money value thereof, the full amount of extra compensation provided for in the contract.

ERASTUS W. SMITH,
GEO. H. REYNOLDS.

I refuse to agree to any award for extra compensation, believing that the contractor has not accomplished anything valuable, that he did not bind himself to do by the terms of agreement for the fixed price named therein, and that no annual saving in any particular has been shown.

FRED'C. GRAFF.

NEW YORK, Feb. 24, 1874.



AGREEMENT WITH GEORGE H. CORLISS FOR A PUMP- ING ENGINE FOR HOPE PUMPING STATION.

This agreement, made and concluded this eighth day of February, in the year eighteen hundred and seventy-two, by and between the City of Providence, represented by its Water Commissioners, of the first part, and George H. Corliss, of the second part ;

Witnesseth : That whereas, the said party of the second part has proposed to furnish the said party of the first part, a pumping engine for the "High Service," to be located on the southerly side of Olney street, in the said City of Providence, "capable of raising, with ease, five million gallons of water in twenty-four hours, to a height in a stand pipe, of one hundred and twenty feet above low water, under a possible varying head of forty feet on the suction; to work smoothly, steadily and easily when delivering but one million gallons in twenty-four hours; with Boilers and all appurtenances complete; the Pumps, Boilers and appurtenances to be well set and put in all respects into condition for use, including transportation and cost of erection, and the attachment of the suction and force mains."

REPORT OF COMMITTEE TO TEST PUMPING ENGINES. xi

And Whereas, The said party of the second part has proposed to construct the said Pumping Engine according to his own plans and to assume the entire responsibility of its working and of its successful performance of all the peculiar requirements of the Pumping Station where it is to be located:

Now therefore, It is hereby agreed as follows, viz:—

The said party of the second part in consideration of the covenants herinafter contained, agrees to construct and to furnish to the said party of the first part, a Pumping Engine, including foundations, Boilers and appurtenances, and setting complete, in strict accordance with his proposition as aforesaid; the work to be completed and the engine exhibited in place, with steam on, in readiness to pump water, on the first day of October now next ensuing.

The party of the first part agrees to furnish reliable ground for foundations at a level not lower than six feet below the floor of the engine-house, as a base on which the foundations of the engine shall be built, and also to furnish such ground for the boilers at the level of the fire-room floor; also, to construct a suitable chimney, together with suitable flues for connecting the same with the setting of the boilers and proper enclosure for the work; also, to furnish the necessary suction and force mains to convey water to and from the engine, with their appurtenances, excluding all special castings required on account of the peculiar construction of the engine.

All to be done in such good time as will cause no delay or expense to the said party of the second part, and affording him all reasonable facility and convenience for doing his work.

It is agreed by the parties hereto, that, on or before the completion of the work hereinbefore agreed to be done, a committee of three persons, to be agreed upon by the parties, or in case of their inability to agree, to be chosen, one by each party, and the third by the two so chosen, shall make a comparative test of the value of the engine herein contracted for with that of the Duplex Pumping Engine now in operation at the Pettaconset Pumping Station, under ordinary working conditions, while delivering two million gallons in twenty four hours, including in such test the duty, cost of attendance and supplies, durability, immunity from accident and need of repairs, adaptability to the peculiar service required at the High Service Pumping Station, and such other conditions as may affect the practical value of a Pumping Engine for the service intended. The conditions and manner of conducting the test to be determined by the aforesaid committee, who shall make a full report of the same in detail, together with an estimate of the money value of each point considered.

The sum to be paid by the said party of the first part to the said party of the second part, in full compensation for the aforesaid Pumping Engine shall be thirty-four thousand dollars, provided, that it shall

appear from the report of the aforesaid committee that the said Corliss Engine is of equal practical value with the said Duplex Engine, and a further sum equal to the estimated annual saving, (if any such saving shall be reported by the committee), for ten years, without deduction for interest, provided however, that the total sum to be paid for the said Corliss Engine shall not be more than fifty-five thousand dollars, however great its value may be according to the report of the committee.

The sum determined as due shall be payable on the acceptance of the engine after the report of the committee.

It is further agreed that if it should appear from the report of the aforesaid committee, that the said Corliss Engine is inferior in value to the said Duplex Engine, then and in that case the said party of the second part shall allow his engine to remain for the use of the city, without charge, for a period not exceeding nine months, in order that time may thus be given for the substitution of another engine, after which he shall remove it at his own cost, without claim for compensation in any way for the work he has done, or for expense he has incurred.

And the said party of the second part further agrees that the said party of the first part shall have the option of the purchase from him of a second engine of the same construction, at the same price as may have been determined for the first.

It is further agreed that the charges of the committee aforesaid shall be borne equally by each party.

In witness whereof the parties to these presents have hereunto set their hands and seals, the day and year first above written.

The City of Providence, by its	{	M. B. LOCKWOOD,	[L. S.]
Water Commissioners,		CHAS. E. CARPENTER,	[L. S.]
		JOSEPH J. COOKE,	[L. S.]

GEORGE H. CORLISS, [L. S.]

Signed and sealed in presence of
WILLIAM APLIN, witness to all the
signatures.

1873-74.

CITY DOCUMENT.

No. 82.

FIRST QUARTERLY REPORT
OF THE BOARD OF
WATER COMMISSIONERS
OF THE
CITY OF PROVIDENCE,

(Elected February 27, 1874.)

JUNE 1, 1874.



PROVIDENCE:
HAMMOND, ANGELL & CO., PRINTERS TO THE CITY.
1874.

100
100



1873-74.

CITY DOCUMENT.

No. 82.

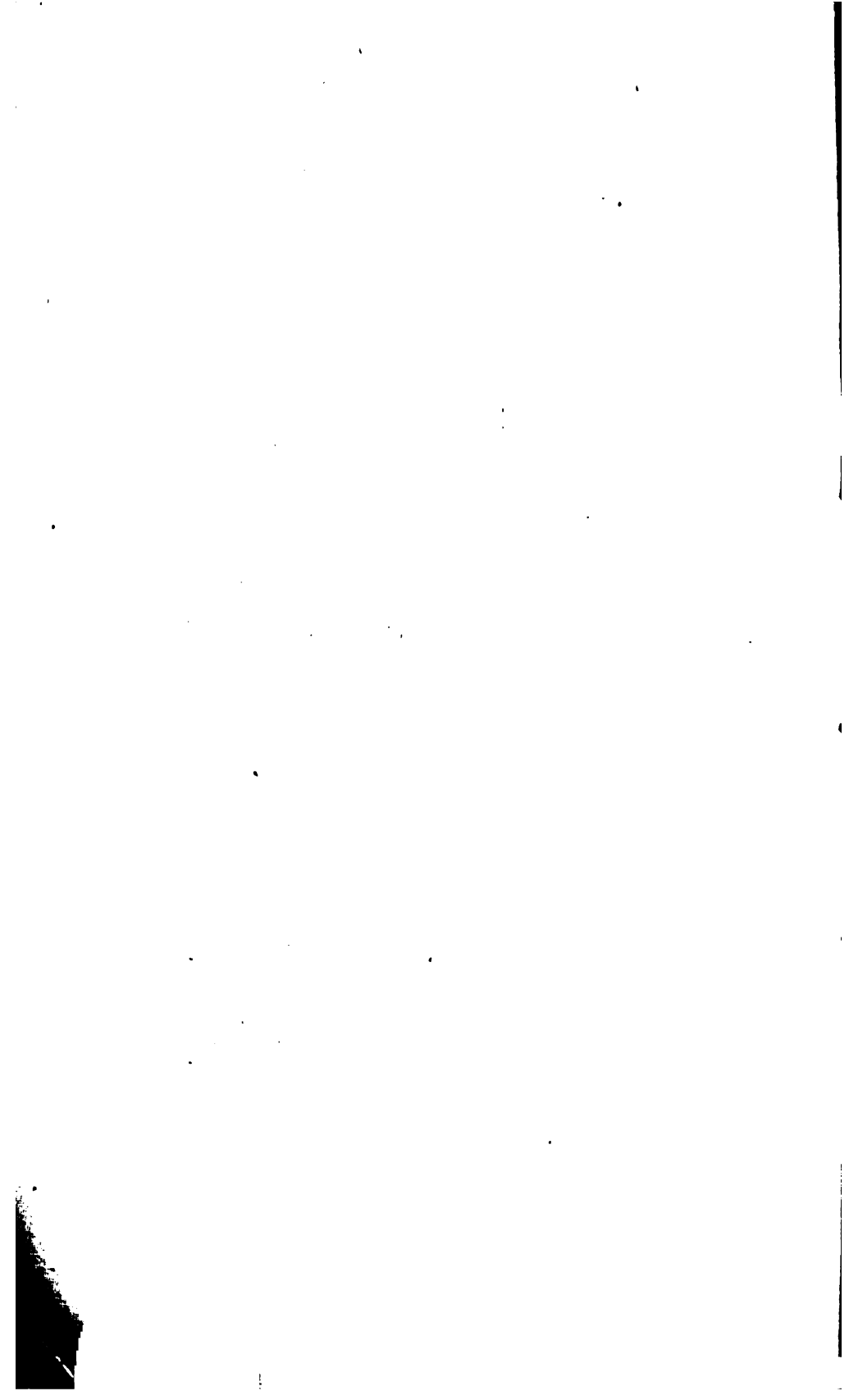
FIRST QUARTERLY REPORT
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1874.



ORGANIZATION
OF THE
PROVIDENCE WATER WORKS.

BOARD OF WATER COMMISSIONERS.

JOSEPH J. COOKE, PRESIDENT.

CHARLES E. CARPENTER,

WILLIAM CORLISS.

SECRETARY OF THE BOARD OF WATER COMMISSIONERS.

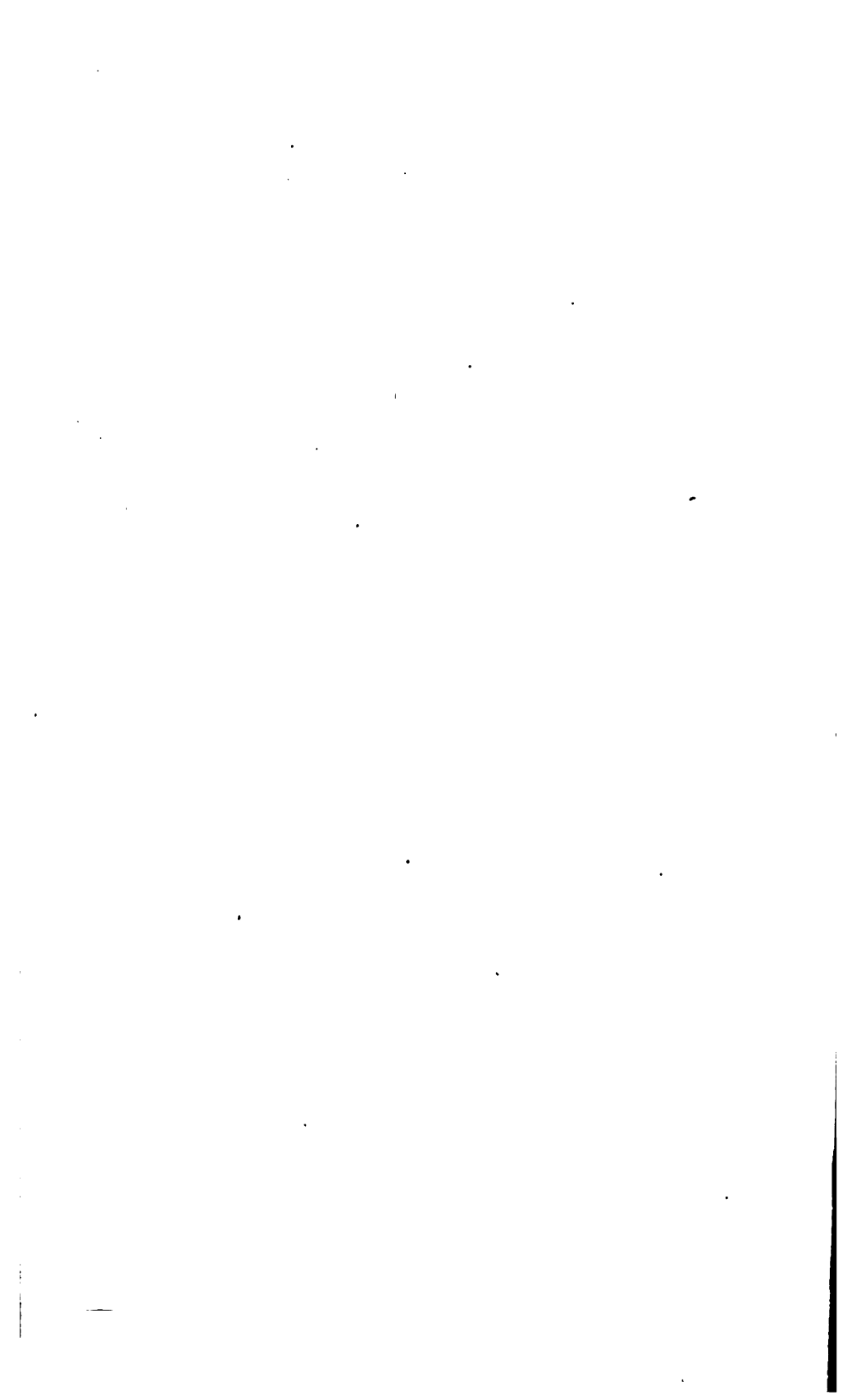
CLINTON D. SELLEW.

Office No. 35 North Main street.

CHIEF ENGINEER.

J. HERBERT SHEDD.

Office No. 35 North Main street.



REPORT.

OFFICE OF THE BOARD OF WATER COMMISSIONERS, }
PROVIDENCE, June 1st, 1874. }

TO THE HONORABLE THE CITY COUNCIL:

The undersigned, Water Commissioners, elected February 27th, 1874, under "An ordinance to establish a Board of Water Commissioners," approved same day, respectfully present their First Quarterly Report:

The Commissioners, having been duly qualified by taking the oath of office, administered by His Honor the Mayor, organized on the first day of March by the election, unanimously, of Joseph J. Cooke as President. The following resolution was then adopted:

"Resolved, That all persons who were in the employment of the former Water Commissioners when the term of office of said Commissioners expired, are hereby appointed to the same positions then held by them, with the same compensation; their appointment to date from March 1, 1874."

Edmund B. Weston has been appointed Assistant Engineer, with a salary of one thousand dollars per annum, dating from March 13, 1874. Mr. Weston had served for three years as a student in the Engineering Department.

Henry N. Francis has been appointed Assistant Engineer, with a salary of one thousand dollars per annum, dating from April 3, 1874. Mr. Francis had served for three years as a student in the Engineering Department.

The salary of Thomas C. Gushee, Commissioners' clerk, has been increased to twelve hundred dollars per annum, dating from March 1, 1874.

Charles F. Janes has resigned the position of service pipe engineer. His resignation took effect March 31, 1874.

William F. Janes has been appointed service pipe engineer, with a salary of one thousand dollars per annum, dating from April 1, 1874.

The salary of Lucius J. Sampson, Assistant Engineer, has been increased to twelve hundred dollars per annum, dating from April 1, 1874.

George F. Munro, Assistant Engineer, died 23d ultimo. He was a young man of much promise.

On the 23d of March, the Commissioners advertised for proposals for furnishing 500 tons, of 2,240 pounds each, of six inch cast iron water pipes. The proposals received were opened April 2d and were all rejected. An offer made by Zechariah Chafee, of Providence, April 3d, to furnish these pipes at \$52.50 per ton was accepted, and a contract was afterwards, at his request, duly executed with the Warren Foundry and Machine Company, of Phillipsburg, N. J.

On the 28th of March, an offer, made by the Builders' Iron Foundry of Providence, to furnish 875 tons of 2,240 pounds each, of thirty-six inch cast iron water pipes, at \$50 per ton, was accepted. (Proposals for furnishing these pipes, opened in December last, had been rejected.) A contract was after-

wards, in accordance with the request of said Builders' Iron Foundry, duly executed with the Warren Foundry and Machine Company, of Phillipsburg, N. J. The quantity named in the contract is 935.72 tons.

On the 28th of March the Commissioners advertised for proposals for trenching and back-filling and laying water pipes during the present year. The proposals received were opened April 7th, and the contract was awarded to George B. and Willard F. Inman, of this city. A contract was subsequently duly executed with them.

On the 9th of April, an offer made by Paulding, Kemble & Co., ("West Point Foundry"), Cold Spring, Putnam Co., N. Y., to construct a Cornish Engine, and erect the same at Pettaconset, for the sum of \$120,000, was accepted. The specifications (printed last year) name certain "tools and fixtures," and "extra work," (including base of stand pipe,) to be furnished by the contractor. The prices named in the proposal were as follows, viz.: for the engine, \$106,000; for tools and fixtures, \$1,900; for extra work, \$12,100; total, \$120,000. On the other hand, the specifications provide that the "piston and pump rods, cross-heads, links, beam end centers and beam main centers will be furnished, in rough forging, at the contractors' works, at the expense of the commissioners." The contractors engage that the engine shall be in running order in one year from date of contract, under a penalty of thirty dollars per day. A contract, dated April 9, 1874, has been duly executed. On the 18th of April, an offer made by the same parties to furnish certain wrought iron forgings, at specified prices per pound, was accepted.

An offer of Hopkins & Pomroy, to furnish 1,500 net tons of Delaware and Hudson Canal Co's Lackawanna Coal, grate size, to be delivered as required, at Pettaconset, at \$7.45 per ton, and 400 tons same coal, stove size, delivered at Hope Pumping Station, at \$7.35 per ton, has been accepted.

An offer of the Providence and Newport Lead Works to furnish, delivered in Providence, 20,000 lbs. tin-lined lead pipe at 14.40 cents, has been accepted.

On the 19th of March a crack developed itself in the steam jacket of one of the cylinders of the Worthington engine, at Pettaconset, while doing its ordinary work. It was repaired in the course of a few days, but in a short time another crack occurred, which was also repaired, since which there has been no trouble. The casting was found, on examination, to be very imperfect, and of uneven thickness, and the Commissioners felt that it would not be prudent to rely upon it; they therefore accepted Mr. Worthington's offer to furnish a cylinder casting, bored, planed and fitted (so far as it can be fitted in advance), for \$1,250, delivered in New York.

The work of laying service pipes is now done by the Commissioners.

The foundation of the engine-house at Pettaconset has been completed. The foundation of the boiler-house is still in process of construction. The superstructure of the engine-house has been commenced.

A good deal of work has been done on Hope reservoir. The reservoir, however, is not in so advanced a state as could be wished. Some three hundred and fifty men are now employed upon it.

Appended to the last report of the Water Commissioners, (made February 28, 1874), was the report of the committee appointed to make a comparative test of the Hope and the Pettaconset Pumping Engines. On the 5th of March the Commissioners wrote a communication to the committee asking them many questions, and stating that they had not fulfilled all the duties of their appointment. The Commissioners also requested them to amend their report. A copy of this

communication was forwarded to each member of the committee, and a copy was also furnished to George H. Corliss. On the 7th of April, the individual answer of Frederic Graff was received. A reply to this communication was made by the Commissioners under date of 16th April. On the 2nd of May a reply to the Commissioners' communication of 5th March, was received from George H. Reynolds and Erastus W. Smith. This reply was dated April 24th. No reply to this has been made by the Commissioners. The above named correspondence, as also the two subjoined communications have appeared in the newspapers. The committee have neither amended their report nor furnished the information requested.

The following is a copy of a communication from George H. Corliss :

PROVIDENCE, R. I., 16th April, 1874.

JOSEPH J. COOKE,	} <i>Water Commissioners.</i>
CHARLES E. CARPENTER,	
WILLIAM CORLISS,	

GENTLEMEN:—A period of nearly seven weeks having elapsed since you received the report of the committee provided for in my contract for the engine at Hope Pumping Station, I deem it proper that I should ask of you an official statement of your action in regard to that report.

An immediate reply will oblige, ..

Yours respectfully,
GEO. H. CORLISS.

The following is a copy of the Commissioners' answer :

OFFICE OF THE BOARD OF WATER COMMISSIONERS,	}
PROVIDENCE, April 17th, 1874.	

GEORGE H. CORLISS, ESQ. :

DEAR SIR:—Your communication of yesterday has been received. The Commissioners reply that, on the 5th day of

March ultimo, a communication was addressed to the committee, in which it was stated that their duties had not all been fulfilled, and requesting them to amend their report. A copy of this communication was sent to you on the same day, and its receipt has been acknowledged.

As the committee have neither amended their report nor signified their intention of doing so, it is now fair to presume that it will not be amended.

In no part of the contract are the committee authorized to award any sum as compensation to the contractor. The Commissioners deny any obligation to pay either the larger sum awarded by the majority of the committee only, or the smaller sum awarded unanimously.

The Commissioners now propose that the parties to the contract shall appoint a new committee to act under its provisions, or, if you should prefer, to submit the rights of the said parties, as far as relates to the said contract, and all action under it, to the decision of referees acting under a rule of court.

Yours respectfully,

JOSEPH J. COOKE,	}	<i>Board of Water Commissioners.</i>
CHAS. E. CARPENTER,		

Plumbers' licenses have been issued as follows :

James E. Corcoran,	Henry K. Gardner,
Robert B. Strong.	

The whole number of plumbers' licenses issued is forty-five.

The following statement shows the length of pipes laid during the last quarter ; the size of the pipes ; where laid, and the totals since the commencement of the work :

24-INCH.

In College and Prospect streets,	810 feet.
Including 1 cut pipe, and 4 curved pipes.	
Previously,	20,434 feet.
Total,	<hr/> 21,244 feet.

16-INCH.

In Branch avenue and in Orms and Smith streets,	2,537 feet.
Including 6 cut pipes, 15 branches, 2 curved pipes, and 1 gate.	
Previously,	15,638 feet.
Total,	<u>18,175 feet.</u>

8-INCH.

In Bourbon and Broad streets,	1,693 feet.
Including 8 cut pipes, 15 branches, 6 curved pipes, and 1 gate.	
Previously,	58,383 feet.
Total,	<u>60,076 feet.</u>

6-INCH.

In Ashburton, Dexter, Durfee, Howell, Paine, Ring, School, Scott, Susan, Whitmarsh and Zone streets, and in Doyle and East avenues,	6,469 feet.
Including 31 cut pipes, 16 branches, 10 curved pipes, and 17 gates.	
Previously,	312,960 feet.
Total,	<u>319,429 feet.</u>
Total of all sizes during the last quarter,	11,509 feet,
or 2.179 miles.	
Previously including 10,12, 20,30, and 36 inch, of which none have been laid during the last quarter,	494,937 feet.
Total,	<u>506,446 feet,</u>
or 95.91 miles.	

Seventeen fire hydrants have been set during the last quarter, one in each of the following locations :

Broad street,	north-west corner of Henry street
" "	" " Plenty "
" "	" " Lawrence street
" "	west side, in line with south side of Peace street.
Dexter "	west side, 222 feet north of Warren street.
Doyle Avenue,	north-west corner of East avenue.
East "	" east " Olney street.
" "	" " " Creighton street.
Howell street,	" west " East avenue.
Orms "	south side, 131 feet east of east line of Franklin street.
" "	south side, opposite west line of Bath street.
" "	south side, opposite east line of Zone street.
Paine street,	east side, 252 feet north of Cranston street.
School "	north-west corner of Harris avenue.
Smith "	south side, in line with west side of Windsor street.
Susan "	south side, 146 feet west of west building line of Parade street.
Whitmarsh street,	south side, about 250 feet west of Greenwich street.

The total number of fire hydrants is now seven hundred and forty-five.

One hydrant has also been set for use in filling sprinkling carts, etc. The number of such hydrants is now twenty-four, a portion of which can be used with a single line of hose for extinguishing fires.

The average daily consumption of water during the last quarter has been about 1,700,000 gallons.

The height of water in Sockanosset Reservoir at 7 o'clock this morning, was 180.05. High water in the Reservoir is 180.50 (above high tide in Providence river).

One hundred and twenty-three Ball & Fitts' water meters, made by the Union Water Meter Company, twenty-seven Worthington water meters, and ten water meters made by Fales, Jenks & Sons, have been put in at the expense of water takers since the date of the last report. One two-inch Ball & Fitts' water meter was set May 13th, and one one-inch water meter made by Fales, Jenks & Sons, was set May 26th, at the expense of the city. Two five-eighths-inch Ball & Fitts' water meters, burst by freezing, have been removed, and the parties now pay schedule rates.

There are now fourteen hundred and thirty-six water meters in use, viz. :

KIND.	SIZES.						Total.
	$\frac{3}{4}$ inch.	$\frac{1}{2}$ inch.	1 inch.	$1\frac{1}{2}$ inch.	2 inch.	4 inch.	
Ball & Fitts...	952	178	72	42	9	1	1,254
Worthington..	170	...	..	..	..	1	171
Fales, Jenks & Sons.....	...	...	11	..	..	..	11
	1122	178	83	42	9	2	1,436

The total number of applications for a supply of water is forty-eight hundred and six.

The number of service stops opened during the last quarter is three hundred and eighteen; three of which are for fire purposes only.

The total number of service stops opened to date is thirty-eight hundred and seventy-two.

Five stops have been closed during the last quarter for non-payment of bills, two of which have been re-opened on pay-

ment of the bills and a penalty in each case of two dollars. One stop was closed to enable the owner to set a meter; there being no stop-cock on the premises the charge of two dollars was paid at the time the request was made to have it closed; the stop has since been re-opened. Four stops previously closed by request where a charge of two dollars was paid, have been re-opened. Eight stops previously closed for non-payment have been re-opened during the last quarter, and in each case a penalty of two dollars was paid; and one stop, for reason of attendant circumstances, was re-opened without charge. Thirty-two stops closed for non-payment remain unopened.

Water is now supplied for the following uses :

7 bakeries; 30 banks; 58 bar-rooms; 1 bath house; 1 bath house—Turkish; 94 boarding houses; 6 bottling establishments; 24 building purposes; 1 car house; 3 carriage depositories; 1 Christian Union; 17 churches; 1 city barn; 1 city bridge—Point street; 1 city building; 5 city drinking fountains; 14 city drinking troughs; 745 city fire hydrants; 9 city fire steamer stations; 2 city hose houses; 6 club rooms; 12 coal yards; 1 colored shelter; 1 conservatory of music; 2 convents; 1 court house; 1 decorator; 1 Dexter Asylum; 1675 dwellings of one family; 1277 dwellings of two families; 116 dwellings of three families; 129 dwellings of four families; 16 dwellings of five families; 25 dwellings of six families; 4 dwellings of seven families; 5 dwellings of eight families; 1 dwelling of twelve families; 2 dye houses; 3 elevators; 1 engine turner; 2 engravers; 1 express carriage house; 41 fire supplies—private; 43 fountains—private; 1 fountain—public; 1 furrier; 2162 garden and street hydrants; 3 gas holders; 5 gold and silver platers; 5 gold and silver refiners; 2 grain elevators; 25 green houses; 10 halls; 1 hall of Latter-Day Saints; 1 Home for Aged Women; 1 hospital; 15 hotels; 1 infirmary; 1 laundry; 1 lithographer; 3 lodging houses; 2 lumber dealers. *Manufacturing Establishments.*—2 belt and picker; 3 blank book; 2 bleacheries; 1 bologna

sausage; 1 bonnet bleachery; 1 boot and shoe; 1 box; 1 braiding works; 2 brass foundries; 1 brewery; 1 brush; 2 butt; 1 butter; 7 carriage; 2 cement pipe; 1 chain; 6 cigar; 1 cigar box; 4 cloak and dress; 1 coffin; 5 confectionery; 1 corset; 3 colorers of jewelry; 7 cotton; 1 crocus; 1 distillery; 3 die sinkers; 1 dye wood; 1 emery wheel; 1 enameler of jewelry; 1 eyelet; 2 file; 7 furniture; 1 gas; 1 gas burner; 4 gas fixtures; 1 geer; 1 hat; 2 harness; 1 horse shoe; 2 ice cream and soda water; 1 ink; 1 iron company; 1 iron fence; 8 iron foundries; 1 Japan switch; 1 jewelers' cards; 75 jewelry; 4 lapidaries; 18 machinists; 1 mowing machine; 1 nail keg; 2 oil; 1 organ; 1 paper box; 1 paper collar; 2 paper cop tube; 1 pattern; 3 patent medicine; 2 picture frame; 2 pump; 1 reed; 1 rubber tubing; 4 sash and blind; 2 screw; 1 sheet iron; 2 shirt; 3 silver ware; 5 soap; 1 spiral spring; 1 starch; 1 steam boiler; 2 steam engines; 1 stencil plate; 1 stove; 2 tanners; 1 thread; 1 tin; 4 tool; 2 top-roll; 5 woolen goods; 1 yeast. *Markets.*—34 fish; 80 meat. *Mills.*—2 drug and grain; 3 flour and grain; 5 marble works; 1 paint; 9 planing. 1 music hall; 1 nickel plater; 3 Odd Fellows' halls; 2 opera houses; 2 orphan Asylums; 5 organs; 5 oyster houses; 456 offices; 8 photographers; 6 plaster and stucco-workers; 5 plumbers; 5 police stations; 10 printing establishments; 9 provision curers and packers; 7 railroads; 1 reading room; 36 restaurants; 1 roofer. *Saloons.*—4 billiard; 3 bowling; 5 ice cream; 11 lager beer; 9 oyster. *Schools.*—1 boarding; 12 private; 27 public; 1 reform. *Shops.*—29 barber; 6 blacksmith; 10 carpenter; 3 cooper; 1 junk; 10 paint; 5 shoemaker; 21 tailor; 5 tinman. *Stables.*—6 hack; 38 livery; 180 private; 2 sale; 53 work. 13 steamboats; 13 steamships; 5 steam and gas pipe fitters. *Stores.*—1 agricultural implements; 32 apothecary; 1 auction; 4 book; 24 boot and shoe; 1 carpet; 1 carriage trimmings; 10 cigar; 17 clothing; 7 confectionery; 2 drug; 23 dry goods; 73 fancy goods; 7 flour and grain; 11 fruit; 10 furniture; 8 gents' furnishing goods; 93 grocery—retail; 15 grocery—wholesale; 8 hardware; 2 hide and leather; 2 hoop

skirt; 10 house furnishing goods; 3 house paper; 3 iron and steel; 10 jewelry; 11 liquor; 1 lime and brick; 2 manufacturers' supplies; 14 millinery; 9 newspaper; 3 oil and paint; 2 paper and paper stock; 1 piano forte; 6 produce—wholesale; 3 sewing machine; 3 stationery; 2 stove; 3 tea; 2 trunk; 1 umbrella; 1 wool; 2 woolen goods; 15 not classed. 1 State Prison; 1 store house; 2 undertakers; 1 United States Custom House building; 2 upholsterers; 2 water boats; 1 wheelwright; 1 wood turner; 3 wood yards

The amount of expenditures during the last quarter, is	-	-	\$147,728 76
The total amount of expenditure, is	-		3,349,241 40
The total amount of appropriations, is	-		3,400,000 00
The unexpended balance, is	-		50,758 60

The amount received during the last quarter, all of which has been paid to the City Treasurer, is

For water supplies,	-	\$16,496 76
For water meters, -		4,114 55
For penalties, -	-	22 00
For sundries,	-	13,597 90
		<hr/>
		34,231 21

The amount received for water in 1872, was	41,003 51
The amount received for water in 1873, was	97,386 09
The amount received for water during the first five months of 1874, is	89,532 42
The total amount received for water to date, is	227,922 02
The amount of all receipts to date, is	358,947 55

An additional appropriation will soon be needed.

A schedule of bills approved during the last quarter, and of receipts during the same time, and a trial balance of ledger, May 30, 1874, are hereunto appended and made parts of this report.

A separate report of that portion of the duties of the Board which relates to sewers, will be presented.

JOSEPH J. COOKE,
CHAS. E. CARPENTER, } *Board of*
WILLIAM CORLISS, } *Water Commissioners.*

SCHEDULE OF BILLS APPROVED BY THE BOARD OF WATER
COMMISSIONERS FROM MARCH 1, 1874, TO MAY 30, 1874, INCLU-
SIVE.

1	Thomas R. Belcher, testing cement,	-	-	\$21 43
2	William Whittaker, " " "	-	-	64 20
3	W. De C. Smith, services and expenses as assistant to com- mittee to test engines, (one-half charged to George H. Cor- liss,) -	-	-	250 00
4	C. H. Delamater & Co., time and expenses of assistants, testing pumping engines, (one-half charged to George H. Corliss,) -	-	-	237 85
5	Lobdell & Newmans, on account for construction of Hope Reservoir, -	-	-	3,025 00
6	W. A. Burdick, Agent, granite, -	-	-	4,310 00
7	Samuel M. Gray, paid by him for labor at Hope Pumping Station, -	-	-	144 88
8	Samuel M. Gray, paid by him for labor at Pettaconset, -	-	-	896 23
9	William S. Briggs, horse hire by engineers, -	-	-	6 00
10	Charles Warren Campbell, carting rubble stone, -	-	-	154 19
11	Wood & Winsor, pipe, elbows, nipples, labor, &c., -	-	-	27 20
12	Daniel F. Burlingame, repairing tools, &c., -	-	-	37 78
13	Dexter Gorton & Co., carpenters' work, lumber, &c., -	-	-	237 40
14	Samuel M. Gray, on account for payments for labor at Petta- conset, -	-	-	300 00
15	Hopkins & Pomroy, coal and cement, -	-	-	1,102 74
16	Union Water Meter Co., water meters, -	-	-	335 37
17	T. W. Hart, horse hire by committee to test engines, (one- half charged to George H. Corliss,) -	-	-	142 51
18	W. A. Burdick, Agent, granite, -	-	-	1,425 00
19	Warren Foundry and Machine Co., cast-iron water pipes, -	-	-	18,146 72
20	Charles H. Pierce, paid by him for labor, (charged to City of Providence, Public Market,) -	-	-	12 00
21	Samuel M. Gray, on account for payments for labor at Petta- conset, -	-	-	100 00
22	Charles H. Pierce, salary as assistant engineer, -	-	-	250 00
23	Samuel M. Gray, " " " " &c., -	-	-	335 00
24	Charles H. Swan, " " " " -	-	-	166 67
25	Otis F. Clapp, " " " " -	-	-	208 33
26	Howard A. Carson, " " " " -	-	-	208 33
27	William T. Schneider, " " " " -	-	-	100 00
28	C. Frank Allen, " " " " -	-	-	125 00
29	John E. Bowen, " " " " -	-	-	100 00
30	Lucius J. Sampson, " " " " -	-	-	83 33
31	George H. Slade, " " " " -	-	-	83 33
32	Daniel D. Waterman, salary as assistant engineer, -	-	-	66 67
33	George F. Munro, " " " " -	-	-	83 33
Amount carried forward, -				\$32,786 57

	Amount brought forward,	-	-	-	\$32,786 57
34	Leprilete Sweet, 2d,	"	"	"	83 33
35	Edmund B. Weston,	"	"	" &c.,	67 21
36	Charles F. Janes,	"	"	service pipe	100 00
37	Augustus F. Nagle,	"	"	mechanical engineer,	200 00
38	Henry N. Francis,	"	"	student, engineering department,	41 67
39	Walter R. Jackson,	"	"	student, engineering department,	37 10
40	Edwin P. Dawley,	"	"	student, engineering department,	33 33
41	Charles M. Hunt,	"	"	"	25 00
42	Frank B. Ferris,	"	"	"	25 00
43	Thomas L. Botts,	"	"	"	25 00
44	William H. Olmstead,	"	"	"	25 00
45	William M. Brown, Jr.,	"	"	"	41 67
46	Daniel C. Stone,	"	"	"	33 33
47	Walter F. Slade,	"	"	service pipe clerk,	83 33
48	William Aplin,	"	"	clerk,	83 33
49	William H. Turner,	"	"	clerk, engineering department,	100 00
50	Andrew B. Purdy,	"	"	superintendent of pipe work,	166 67
51	S. Horace Wheeler,	"	"	inspector of service pipes,	125 00
52	Henry M. Wilcox,	"	"	assistant inspector of service pipes,	30 16
53	Samuel R. Eccleston,			salary as inspector of pipes,	104 00
54	Foster S. Dennis, Jr.,	"	"	"	104 00
55	Frederic A. Arnold,	"	"	" water fixtures,	83 33
56	Burrows Chace,	"	"	" at Hope Reservoir,	75 00
57	Richard K. Randolph,	"	"	"	37 74
58	Henry G. Dennis,	"	"	superintendent of pipe yard,	125 00
59	Richard M. Wood,	"	"	clerk at pipe yard,	66 67
60	Jeptha Baker,	"	"	keeper of Sockanosset Reservoir,	70 00
61	George F. Battey,	"	"	pumping engineer,	100 00
62	John Hamilton,	"	"	fireman,	80 00
63	George F. Barney,	"	"	"	60 00
64	George H. De Forest,	"	"	time-keeper at Hope Reservoir,	67 50
65	William F. Tanner,	"	"	axeman,	46 80
66	Leonard N. Austin, Jr.,	"	"	" commissioners' clerk,	66 67
67	Thomas O. Gushee,	"	"	"	100 00
68	Phillip S. Chase,	"	"	"	125 00
69	Clinton D. Sellow,	"	"	secretary of water commissioners,	200 00
70	George F. Johnson,			care of rooms,	56 38
71	Charles H. Pierce, paid by him for sundries,				26 60
72	Charles H. Pierce, paid by him for labor at wharf,				542 00
73	Samuel M. Gray, horse-hire and paid by him for sundries,				95 60
74	Clinton D. Sellow, paid by him for sundries,				43 41
75	Stone & Carpenter, architectural services,				750 00
76	Bugbee & Hall, stationery, drawing paper, &c.,				56 60
77	Valpey, Angell & Co., stationery,				3 75
78	Providence Press Co., advertising,				66 47
	Amount carried forward,	-	-	-	\$37,265 22

	Amount carried forward,	-	-	\$37,265 23
79	William S. Briggs, horse-hire by engineers,	-	-	9 00
80	Tuttle & Hobbs, horse keeping, &c.,	-	-	85 57
81	Baker & Howe, labor on patterns, shelving, &c.,	-	-	36 00
82	Providence Steam Engine Co., labor of machinists, &c.,	-	-	12 21
83	R. S. Burrough & Co., lard oil,	-	-	40 85
84	Providence Wire Works, brass riddles,	-	-	3 00
85	G. & O. P. Hutchins, shades, chimneys, &c.,	-	-	9 82
85	C. E. Jencks, labor,	-	-	3 15
87	A. C. Eddy & Studleys, packing and tubing,	-	-	52 95
88	Butts & Mason, sponge, putty, &c.,	-	-	2 23
89	John L. Calder, setting meters,	-	-	49 10
90	Henry R. Worthington, water meters,	-	-	671 51
91	Thomas Phillips & Co., laying service pipes,	-	-	70 53
92	Schooner Sarah R. Thomas, freight of water pipes, (charged to Gloucester Iron Works,)	-	-	855 50
93	Samuel M. Gray, on account for payments for labor at Pettaconset,	-	-	300 00
94	Lobdell & Newmans, on account for construction of Hope Reservoir,	-	-	2,075 00
95	W. A. Burdick, Agent, granite,	-	-	4,535 00
96	" " " " " "	-	-	2,135 00
97	William Whittaker, testing cement,	-	-	38 71
98	Thomas R. Belcher, " " " "	-	-	19 35
99	Samuel M. Gray, paid by him for labor at Pettaconset,	-	-	1,621 88
100	" " " " " " Hope Pumping Station,	-	-	195 70
101	Samuel M. Gray, on account for payments for labor at Pettaconset,	-	-	500 00
102	Lobdell & Newmans, extra labor, &c., at Hope Pumping Station,	-	-	29 73
103	Lobdell & Newmans, extra labor, &c., at Hope Pumping Station,	-	-	64 60
104	Knowles, Anthony & Danielson, advertising,	-	-	64 83
105	Providence Gas Co., gas, &c.,	-	-	284 72
106	Royal T. Ingraham, making stone boats, &c.,	-	-	4 04
107	Wood & Winsor, labor, nipples, &c.,	-	-	100 61
108	Daniel F. Burlingame, repairing tools, &c.,	-	-	40 84
109	Providence Nickel Plating Works, plating cups and chains,	-	-	5 50
110	Henry T. Root, brooms and dusters,	-	-	8 08
111	Riley Brothers, felting,	-	-	9 00
112	W. Coleman & Sons, tools,	-	-	11 75
113	Providence and Newport Lead Works, lead,	-	-	41 08
114	M. D. Copeland, teaming &c.,	-	-	44 83
115	Cleveland & Brothers, office furniture, &c.,	-	-	151 75
116	Union Water Meter Co., water meters,	-	-	514 06
117	Wm. H. Miller & Co., repairing tools, &c.,	-	-	71 07
118	Dexter Gorton & Co., carpenters' work, lumber, &c.,	-	-	1,230 82
119	Butts & Mason, oil, &c.,	-	-	6 53
120	Charles Warren Campbell, carting rubble stone,	-	-	485 07
121	Fuller Iron Works, special castings,	-	-	124 65
122	Hopkins & Pomroy, coal, cement, &c.,	-	-	1,160 00
	Amount brought forward,	-	-	\$55,044 12

	Amount brought forward,	-	-	-	\$55,044 12
123	Providence Steam Engine Co., machinists' labor, &c.,	-	-	-	195 82
124	O. C. Williams, repairing telegraph line,	-	-	-	116 73
125	Rhode Island Concrete Company, concreting around hydrants,	-	-	-	194 00
126	Providence Concrete Company, concreting around service boxes,	-	-	-	121 75
127	Henry W. Ellis, trustee to William Elsbree, tools,	-	-	-	10 00
128	Schooner Franklin Pierce, freight of bricks, (charged to S. F. & J. A. Gray.)	-	-	-	180 00
129	C. S. Bradley, counsel fees,	-	-	-	1,500 00
130	Schooner J. C. Thompson, freight of water pipes, (charged to Gloucester Iron Works,)	-	-	-	839 74
131	Charles H. Pierce, salary as assistant engineer,	-	-	-	250 00
132	Samuel M. Gray, " " " " &c.,	-	-	-	335 00
133	Charles H. Swan, " " " " "	-	-	-	166 67
134	Otis F. Clapp, " " " " "	-	-	-	208 33
135	Howard A. Carson, " " " " "	-	-	-	208 33
136	William T. Schneider, salary as assistant engineer,	-	-	-	100 00
137	C. Frank Allen, " " " " "	-	-	-	100 00
138	John E. Bowen, " " " " "	-	-	-	100 00
139	Lucius J. Sampson, " " " " "	-	-	-	100 00
140	George H. Slade, " " " " "	-	-	-	83 33
141	Daniel D. Waterman, " " " " "	-	-	-	66 67
142	George F. Munro, " " " " "	-	-	-	83 33
143	Leprilete Sweet, 2d, " " " " "	-	-	-	83 33
144	Edmund B. Weston, " " " " "	-	-	-	83 33
145	Henry N. Francis, " " " " "	-	-	-	80 56
146	William F. Janes, " " service pipe engineer,	-	-	-	83 33
147	Augustus F. Nagle, " " mechanical "	-	-	-	200 00
148	Walter R. Jackson, " " student, engineering department,	-	-	-	41 67
149	Edwin P. Dawley, salary as student, engineering department,	-	-	-	33 33
150	Charles M. Hunt, " " " " "	-	-	-	32 78
151	Frank B. Ferris, " " " " "	-	-	-	27 78
152	Thomas L. Botts, " " " " "	-	-	-	27 50
153	William H. Olmstead, salary as student, engineering department,	-	-	-	26 39
154	William M. Brown, Jr, salary as student, engineering department,	-	-	-	41 67
155	Daniel C. Stone, salary as student, engineering department,	-	-	-	33 33
156	Alfred E. Martin, " " " " "	-	-	-	25 00
157	George B. Francis, " " " " "	-	-	-	20 83
158	Walter F. Slade, " " service pipe clerk, " " "	-	-	-	83 33
159	William Aplin, salary as clerk, engineering department,	-	-	-	83 33
160	William H. Turner, " " " " "	-	-	-	100 00
161	Andrew B. Purdy, salary as superintendent of pipe work,	-	-	-	166 67
162	George Bowers, " " inspector on pipe line,	-	-	-	64 00
163	S. Horace Wheeler, " " of service pipes,	-	-	-	125 00
164	Henry M. Wilcox, " " assistant inspector of service pipes,	-	-	-	85 00
	Amount carried forward,	-	-	-	\$61,155 98

	Amount brought forward,	-	-	\$61,551 98
165	Samuel R. Eccleston, salary as inspector of pipes,	-	-	130 00
166	Foster S. Dennis, Jr., " " " " "	-	-	104 00
167	Henry G. Dennis, " " " " "	-	-	125 00
168	Burrows Chace, " " " at Hope Reservoir,	-	-	5 00
169	Richard K. Randolph, " " " " "	-	-	130 00
170	Alexis C. Miller, " " " " "	-	-	111 77
171	George W. Mitchell, " " " " "	-	-	115 00
172	Frederic A. Arnold, " " " of water fixtures,	-	-	83 33
173	William G. Budlong, " " " " " meters,	-	-	63 89
174	Irving H. Potter, " " temporary office assistant, en- gineering department,	-	-	41 40
175	Richard M. Wood, salary as clerk at pipe yard,	-	-	66 67
176	Jephtha Baker, " " keeper at Sockanosset Reservoir,	-	-	77 50
177	George F. Battey, " " pumping engineer,	-	-	100 00
178	John Hamilton, " " fireman,	-	-	80 00
179	George F. Barney, " " " "	-	-	60 00
180	George H. DeForest, " " time keeper at Hope Reservoir,	-	-	78 00
181	William F. Tanner, " " axeman,	-	-	48 20
182	Frank U. Carter, testing cement,	-	-	42 75
183	Albert E. Fuller, " " " "	-	-	13 28
184	William Whittaker, " " " "	-	-	10 00
185	Everett Belcher, " " " "	-	-	7 50
186	Leonard N. Austin, Jr., salary as commissioners' clerk,	-	-	66 67
187	Thomas C. Gushee, " " " " "	-	-	100 00
188	Philip S. Chase, " " " " "	-	-	125 00
189	Clinton D. Sellew, salary as secretary of water commission- ers,	-	-	200 00
190	George F. Johnson, care of rooms,	-	-	56 50
191	Charles H. Pierce, paid by him for sundries,	-	-	67 86
192	" " " " labor,	-	-	899 88
193	Samuel M. Gray, horse hire &c.,	-	-	114 09
194	Gladding Bros. & Tibbitts, stationery,	-	-	207 46
195	Akerman & Co., blank books, &c.,	-	-	65 06
196	Wm. S. Briggs, horse hire by engineers,	-	-	33 00
197	Hopkins & Pomroy, teaming,	-	-	96 00
198	M. D. Copeland, " " " "	-	-	15 66
199	J. A. Gowdey & Son, brass tape,	-	-	25 69
200	Darling, Brown & Sharpe, rule,	-	-	8 00
201	Gorham Manufacturing Co., drinking cup and chain,	-	-	14 00
202	M. B. Edson, time and pressure recorder,	-	-	100 00
203	Dexter Gorton & Co., carpenters' work, lumber &c.,	-	-	57 33
204	Providence & Newport Lead Works, tin lined lead pipe and solder,	-	-	3,201 53
205	Armington & Leonard, use of pile driver,	-	-	100 00
206	W. A. Burdick, Agent, labor,	-	-	5 08
207	City of Providence, Commission- } allowance for stock in ers on the Brook street District, } meter burst by freezing,	-	-	5 50
208	Union Water Meter Company, water meters,	-	-	1,796 10
	Amount carried forward,	-	-	\$70,405 67

23

	Amount brought forward,	-	-	\$70,405 68
209	Barker, Whitaker & Co., tools, &c.,	-	-	348 58
210	Schooner Sarah A. Read, freight of water pipes, (charged to Gloucester Iron Works,) -	-	-	663 73
211	S. F. & J. A. Gray, on account for bricks, -	-	-	1,000 00
212	T. J. Hill, rent of wharf, -	-	-	500 00
213	Paulding, Kemble & Co., beam centers and front links, -	-	-	3,299 24
214	Schooner A. H. Belden, freight of water pipes, (charged to Gloucester Iron Works,) -	-	-	594 23
215	Thomas Phillips & Co., laying service pipes, -	-	-	422 10
216	Samuel M. Gray, paid for labor at Hope Pumping Station, -	-	-	57 30
217	" " " " " Pettaconset, -	-	-	4,790 45
218	" " " on account of payments for labor at Pettaconset, -	-	-	600 00
219	Dexter Gorton & Co., carpenters' work, lumber &c., -	-	-	914 91
220	Daniel F. Burlingame, repairing tools, &c., -	-	-	119 88
221	Wm. H. Miller & Co., tools, &c., -	-	-	87 26
222	Wood & Winsor, nipples, tubing, labor, &c., -	-	-	40 01
223	Providence Steam Engine Co., machinists' labor &c., -	-	-	253 61
224	Hopkins & Pomroy, coal, cement and carting bricks, -	-	-	2,780 23
225	M. D. Copeland, carting engine and pile driver to Pettaconset, &c., -	-	-	49 75
226	W. A. Burdick, Agent, granite, -	-	-	45 00
227	" " " " -	-	-	2,710 00
228	" " " " -	-	-	1,415 00
229	Lobdell & Newmans, on account for construction of Hope Reservoir, -	-	-	4,900 00
230	Lobdell & Newmans, extra labor, &c., at Hope Pumping Station, -	-	-	285 55
231	G. B. & W. F. Inman, trenching and back-filling and laying water pipes, -	-	-	1,800 00
232	G. B. & W. F. Inman, carting pipes, -	-	-	251 28
233	Thomas Phillips & Co., on account for lead pipe, &c., -	-	-	1,800 00
234	G. B. & W. F. Inman, setting hydrants, repairing streets, &c., -	-	-	65 50
235	Schooner Elm City, freight of bricks, (charged to S. F. & J. A. Gray,) -	-	-	59 04
236	T. & W. Breck, rent of offices, &c., -	-	-	752 50
237	Charles H. Pierce, paid by him for labor, -	-	-	306 02
238	Bullders' Iron Foundry, special castings, -	-	-	273 94
239	Fuller Iron Works, " " -	-	-	224 00
240	Gloucester Iron Works, cast iron water pipes, -	-	-	32,496 73
241	Steamer Middlesex, freight of water pipes, (charged to Warren Foundry and Machine Co.) -	-	-	128 02
242	William Elsbree, labor of men and teams, -	-	-	52 50
243	Thomas Phillips & Co., laying service pipes, -	-	-	61 41
244	J. Herbert Shedd, salary as chief engineer, -	-	-	2,000 00
245	Charles H. Pierce, salary as assistant engineer, -	-	-	250 00
246	Samuel M. Gray, salary as assistant engineer, &c., -	-	-	335 00
247	Charles H. Swan, salary as assistant engineer, -	-	-	166 67
248	Otis F. Clapp, " " " " -	-	-	208 33
	Amount carried forward,	-	-	\$137,513 44

	Amount brought forward,	-	-	\$137,513 44
249	Howard A. Carson, salary as assistant engineer,	-	-	208 33
250	William T. Schneider, " " " " "	-	-	100 00
251	C. Frank Allen, " " " " "	-	-	100 00
252	John E. Bowen, salary as assistant engineer,	-	-	100 00
253	Lucius J. Sampson, " " " " "	-	-	100 00
254	George H. Slade, " " " " "	-	-	83 33
255	Daniel D. Waterman, " " " " "	-	-	66 67
256	Leprilete Sweet, 2d., " " " " "	-	-	83 33
257	Edmund B. Weston, " " " " "	-	-	83 33
258	Henry N. Francis, " " " " "	-	-	83 33
259	William F. Janes, " " " " "	-	-	83 33
260	Augustus F. Nagle, " " mechanical engineer,	-	-	200 00
261	Walter R. Jackson, " " student, engineering department,	-	-	41 67
262	Edwin P. Dawley, " " " " "	-	-	33 33
263	Charles M. Hunt, salary as student, engineering department,	-	-	33 33
264	Frank B. Ferris, " " " " "	-	-	33 33
265	Thomas L. Botts, " " " " "	-	-	33 33
266	William H. Olmstead, salary as student, engineering department,	-	-	33 33
267	William M. Brown, Jr., salary as student, engineering department,	-	-	41 67
268	Daniel C. Stone, salary as student, engineering department,	-	-	41 67
269	Alfred E. Martin, " " " " "	-	-	25 00
270	George B. Francis, " " " " "	-	-	25 00
271	Walter F. Slade, " " service pipe clerk, engineering department,	-	-	83 33
272	William Apin, salary as clerk, engineering department,	-	-	83 33
273	William H. Turner, " " " " "	-	-	100 00
274	Andrew B. Purdy, " " superintendent of pipe work,	-	-	166 67
275	George Bowers, " " inspector on pipe line,	-	-	104 00
276	S. Horace Wheeler, " " of service pipes,	-	-	125 00
277	Henry M. Wilcox, " " assistant " " "	-	-	85 00
278	Samuel R. Eccleston, salary as inspector of pipes,	-	-	130 00
279	Foster S. Dennis, Jr., " " " " "	-	-	104 00
280	Burrows Chace, " " " " at Hope Reservoir,	-	-	145 00
281	Richard K. Randolph, " " " " " " "	-	-	130 00
282	Alexis C. Miller, " " " " " " "	-	-	105 00
283	George W. Mitchell, " " " " " " "	-	-	115 00
284	Frederic A. Arnold, " " " of water fixtures,	-	-	83 33
285	William G. Budlong, " " " of " meters,	-	-	83 33
286	Irving H. Potter, " " temporary office assistant, engineering department,	-	-	49 00
287	Edward F. Jeffers, salary as temporary office assistant, engineering department,	-	-	9 00
288	William H. Kelly, salary as temporary office assistant, engineering department,	-	-	13 20
289	Henry G. Dennis, salary as superintendent of pipe yard,	-	-	125 00
290	Richard M. Wood, salary as clerk at pipe yard,	-	-	66 67
291	Jephtha Baker, " " keeper of Sockanosset Reservoir,	-	-	75 00
	Amount carried forward,	-	-	\$141,127 61

REPORT OF THE WATER COMMISSIONERS.

25

	Amount brought forward, - - -	\$141,127 61
292	George F. Battey, salary as pumping engineer, -	100 00
293	John Hamilton, " " fireman, -	80 00
294	George F. Barney, " " " -	60 00
295	George H. DeForest, " " time-keeper at Hope Reservoir, -	86 40
296	William F. Tanner, " " salary as axeman, -	53 20
297	Frank U. Carter, testing cement, -	58 27
298	Everett L. Belcher, " " -	32 50
299	Leonard N. Austin, Jr., salary as commissioners' clerk, -	66 67
300	Thomas C. Gushee, salary as commissioners' clerk, -	100 00
301	Phillip S. Chase, " " " " -	125 00
302	Clinton D. Sellew, " " secretary of water commissioners, -	200 00
303	Joseph J. Cooke, " " " " -	500 00
304	Charles E. Carpenter, " " " " -	500 00
305	William Corliss, " " " " -	500 00
306	George F. Johnson, care of rooms, -	56 50
307	Charles H. Pierce, paid by him for sundries, -	61 71
308	" " " " labor, -	1,183 52
309	Samuel M. Gray, horse-hire, and paid by him for sundries, -	82 03
310	S. R. Eccleston, expenses to Phillipsburg, -	12 00
311	A. F. Nagle, " " Cold Spring, &c., -	31 25
312	H. G. Dennis, expenses to Phillipsburg, &c., and return, -	30 03
313	Stephen Knobb, carting stone, -	3 17
314	B. F. Almy, machine cops, -	26 00
315	James Phillips & Co., water gauge, labor, &c., -	98 83
316	W. P. Knickerbocker & Co., rope, &c., -	126 60
317	F. H. Evans, expansion bolts, -	30 00
318	Louis W. Clarke, adjusting telegraph instruments, -	5 50
319	Daniel M. Knowlton, charcoal, -	36 00
320	George A. Johnson & Son, one horse, -	200 00
321	Moulton & Ingraham, stakes, -	5 00
322	William S. Briggs, horse-hire by engineers, -	21 00
323	Newport Manufacturing Co., couplings, -	50 63
324	Hopkins & Pomroy, coal and carting bricks, -	349 00
325	Horace B. Bowen, hydrant bolts and pipe bolts, -	152 69
326	M. D. Copeland, teaming, -	11 23
327	Providence and Newport Lead Works, lead pipe and solder nipples, -	26 47
328	A. Carpenter, special castings, -	4 70
329	Union Water Meter Co., water meters, -	1,535 25
		<hr/>
		\$147,728 76

RECEIVED FROM MARCH 1, 1874, TO MAY 30, 1874, INCLUSIVE,
AND PAID TO THE CITY TREASURER.

1874.

March, 5.	Of Henry G. Dennis, for materials,	\$7 10
5.	Of John Smurthest, for three months' rent of farm in Warwick, purchased of Richard U. Rhodes and wife, to June 1, 1874,	56 25
6.	Of City of Providence, for sewer expenses,	8,581 25
7.	Of Fall River Iron Works Co., for repairing meter,	1 00
14.	Of Samuel M. Gray, for sundries,	4 25
23.	Of Darling, Brown & Sharpe, for cast iron water pipe,	22 21
23.	Of Chicopee Manufacturing Co., for services of Samuel R. Eccleston as inspector of pipes, &c.,	125 48
23.	David Cady & Co., for repairing meter,	2 37
30.	Of Providence Steam & Gas Pipe Co., for repairing meter,	2 00
31.	Of Peleg P. Cranston, for three months' rent of "Randall Estate," so called, in Pawtuxet, to April 1, 1874,	50 00
April 2.	Of Albert Weaver, for repairing meter,	1 50
3.	Of City of Providence, for sewer expenses,	752 67
16.	Of M. J. Higgins, for repairing meters,	50
17.	Of Daniel Holmes, for repairing sidewalk,	3 66
18.	Of City of Providence for sewer expenses,	20 00
24.	" " " " " "	2,796 38
25.	Of Thomas Pearson, for labor and materials,	136 79
29.	Of Stephen Thurber, for laying service pipe,	14 21
May 2.	Of Albert Dailey & Co., for labor and materials,	299 38
5.	Of Rhode Island Hospital, for labor and materials,	670 03
23.	Of Amos D. Smith, 3d, for laying service pipe,	19 47
30.	For couplings for street sprinklers during the present quarter,	16 10
	For repairing meters, during April and May,	15 30
	For water during the present quarter,	16,496 76
	For meters during the present quarter,	4,114 55
	For penalties during the present quarter,	22 00
		<hr/> \$34,231 21

TRIAL BALANCE OF LEDGER, MAY 30, 1874.

Dr.

Hope Reservoir, for land,	\$124,122 80
" " " sundries,	829 86
" " " labor,	1,808 15
" " " gate chambers,	3,979 80
" " " drain,	404 08
" " " inspection,	3,826 40
" " " conduit,	2,540 10
" " " slope wall,	155 16
Hope engine house,	102,256 89
" " " for lights,	455 63
Hope pumping station, for coal and wood,	1,784 18
" " " sundries,	275 60
Night and Sunday watch at Hope engine house,	41 23
Sockanosset Reservoir, for construction,	177,870 72
" " " sundries,	4,255 55
" " " land,	16,074 35
" " " watch,	2,186 75
" " " gate houses,	18,596 17
" " " drain,	2,431 13
" " " inspection,	6,819 18
" " " extra work and materials,	189 70
" " " gate chambers,	19,299 27
Line of leading mains, for labor and materials,	19,808 52
" " " extra trenching, etc.,	305 95
" " " land and damages,	1,665 00
Force main line for land and damages,	3,006 35
" " " labor and materials,	5,099 28
" " " extra trenching, etc.,	332 56
Office furniture, stoves, gas fixtures, etc.,	1,212 46
Rent of offices,	3,700 00
Books, stationery, etc.,	924 76
Fuel and lights,	267 55
Horse hire by commissioners,	19 00
Janitor of rooms,	656 00
Traveling expenses of commissioners,	122 62
Clerks' salaries,	7,284 52
Commissioners' salaries,	28,206 78
Secretary's salary,	4,366 71
Sundries,	485 96
Printing,	2,042 57
Advertising,	1,815 92
Fences,	2,050 38
Stop valves,	58,206 72
Store house and work shop,	1,307 88
Rent of wharves and pipe yard,	4,698 99
Linking curved pipes,	232 75
Tools,	8,886 53
Amount carried forward,	\$646,248 91

Amount brought forward,	\$646,248 91
Labor on pipes,	15,932 14
Cast iron water pipes,	1,124,590 24
Special castings,	85,351 02
Lumber,	1,576 30
Fire hydrants,	93,152 27
Sockanosset hill cross road,	3,835 38
Pettaconset and Sockanosset telegraph line,	1,682 59
Dwelling houses at Pettaconset,	9,543 46
Culverts and bridge on line of force mains,	6,775 33
Culverts at Pettaconset,	3,557 02
Real estate in Warwick,	13,118 04
Water privileges, mill and other real estate in Pawtuxet,	50,231 96
Pochasset bridge,	5,559 82
Wharf salaries,	7,182 79
Temporary engine house at Pettaconset,	9,382 70
Road, slopes, etc., at Pettaconset,	11,529 86
Engine house at Pettaconset,	152,965 43
Natural filter basin,	33,594 50
Removing loam,	462 95
Iron screw piles,	3,766 46
Hydrant bolts,	1,635 98
Pipe bolts,	1,507 45
Photographs,	284 25
Hydrant heads,	7,448 00
Taps and stops,	13,891 59
Valve covers,	7,895 74
Service pipe,	28,041 93
Hydrant boxes,	26,197 41
Setting fire hydrants,	9,577 09
Check valves,	1,412 43
Valve boxes,	26,835 47
Air cocks, boxes, covers and setting,	500 05
Night and Sunday watch at engine house,	1,534 33
Pettaconset pumping station, for sundries,	3,154 38
" " " " engineer,	3,498 28
" " " " coal and wood,	24,489 88
" " " " labor on fuel,	1,592 72
" " " " firemen,	3,817 08
" " " " land,	26,386 77
Setting blow offs,	296 66
Ascertaining and removing nuisances on Pawtuxet river,	479 46
S. F. & J. A. Gray,	1,239 04
Fuller Iron Works,	523 19
Warren Foundry and Machine Co.,	128 02
Loddell & Newmans,	60,400 00
A. & W. Sprague Manufacturing Co.,	2,500 00
Thomas Phillips & Co.,	7,175 00
Paulding, Kemble & Co.,	3,299 24
W. A. Burdick, Agent,	44,199 19
Samuel M. Gray,	600 00
City of Providence, Fountain, Abbott Park,	707 07
City of Providence, Public Market,	12 00
City Treasurer,	131,025 53
" " for water payments,	227,922 02
Amount carried forward,	\$2,949,633 22

REPORT OF THE WATER COMMISSIONERS.

29

Amount brought forward,	\$2,949,633 23
Testing pipe iron,	443 50
Iron drain pipes and gate,	224 21
Carting pipes,	29,666 61
Counsel fees,	6,100 00
Inspection of pipes,	9,134 16
Testing bolts and composition castings,	84 25
Laying water pipes,	331,250 14
Laying service pipes,	24,540 20
Laying suction pipe, etc.,	85 00
Drainage pump and engine,	4,980 67
Hydrants for street sprinklers,	1,975 06
Inspection of pipe laying,	23,515 07
Temporary boarding house at Pettaconset,	1,240 34
Public drinking fountains and troughs,	728 62
Expense of testing engines,	3,120 80
Water meters,	42,261 98
Water meters set, belonging to the city,	1,101 00
Setting, inspection and repairs of meters,	126 52
Inspection of water fixtures,	2,248 73
Warwick test pits,	1,259 58
Miller boilers at Pettaconset,	94 24
Worthington pumping engine,	40,518 14
Cornish pumping engine,	31 25
	<hr/> \$3,474,308 28

ENGINEERING DEPARTMENT:—

For Instruments,	\$2,781 15
Tools,	659 40
Furniture, stoves, gas fixtures, etc.,	2,676 02
Books, stationery, etc.,	2,303 47
Draughting,	3,523 52
Labor,	5,766 40
Horse and wagon account,	1,689 47
Horse keeping, shoeing, etc.,	1,431 27
Horse hire,	3,755 40
Rent of Offices,	6,790 61
Fuel and lights,	666 68
Janitor of rooms,	1,303 42
Experimental filter,	91 06
Sundries,	2,647 08
Test wells,	1,579 40
Consultations,	827 06
Office building at Pettaconset,	553 21
“ “ “ Sockanosset Reservoir,	563 22
Stakes and strips,	709 21
Printing,	418 96
Maps,	86 67
Service pipe experiments,	295 76
Temporary assistance,	7,053 57
Salaries,	114,941 53
	<hr/> \$163,642 53
Amount carried forward,	\$3,637,945 86

Amount brought forward,

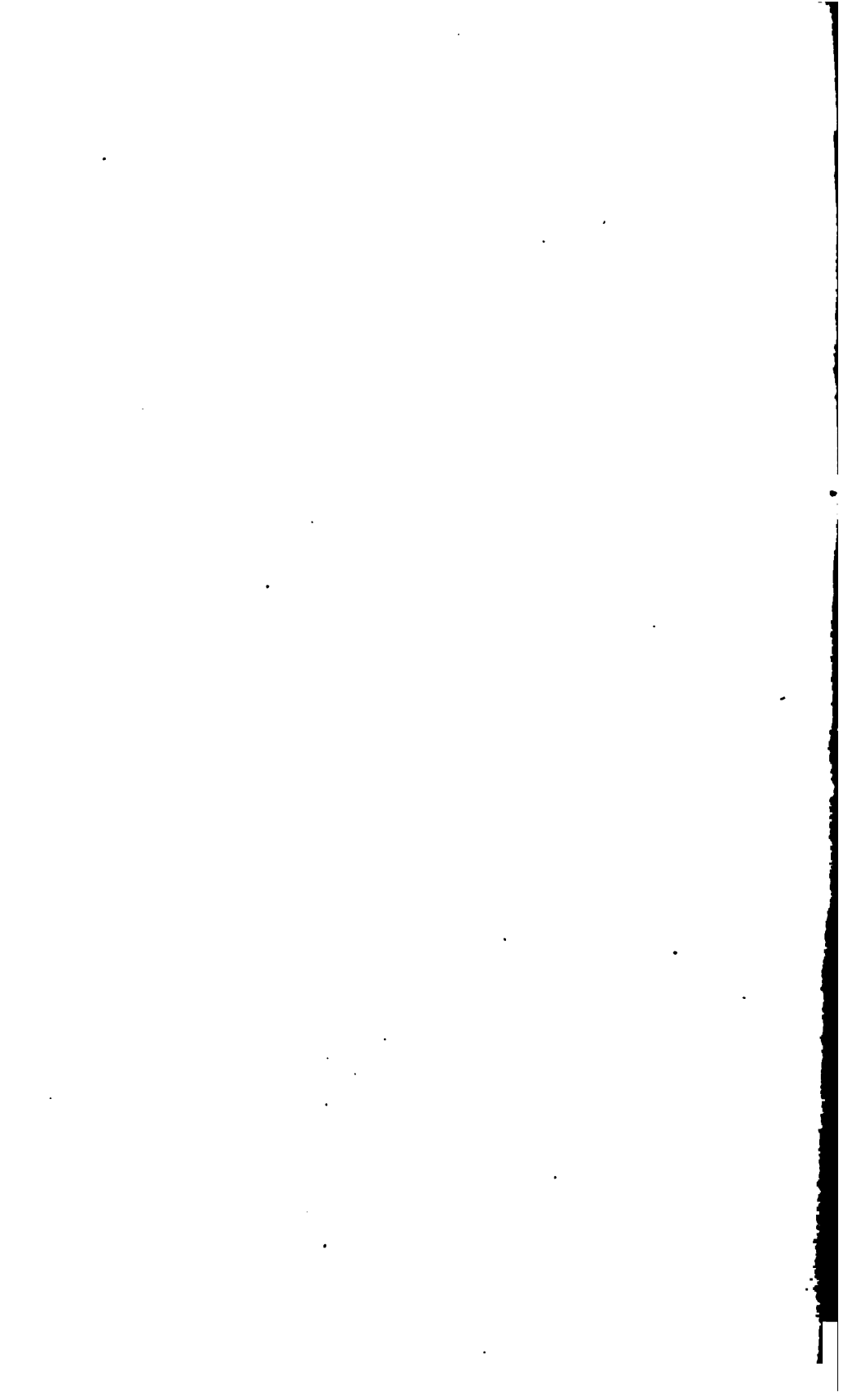
\$3,687,945 86

CR.

Hope Reservoir for land, (rents received and buildings, etc. sold),	\$5,888 28
Sockanosset Reservoir, for land, (rents received and wood, etc., sold),	1,534 49
Real estate in Warwick, (rents received),	1,031 25
Water privileges, mill and other real estate in Pawtuxet, (rents received),	3,889 53
Pettaconset pumping station, for land, (rents received),	487 39
G. B. & J. M. Cornell,	1,000 00
J. B. & W. F. Inman,	700 00
Interest,	54 66
Boston hydrants,	28 29
Gloucester Iron Works,	3,925 00
Water meters,	42,580 55
Penalties,	168 00
Water,	237,922 02
Approved bills,	3,349,341 40
	<hr/> \$3,687,945 86

**SCHEDULE OF RECEIPTS FOR WATER, BY MONTHS, FROM
COMMENCEMENT TO JUNE 1st., 1874.**

MONTH.	1872.	1873.	1874.
January.....		\$40,699 09	\$69,356 70
February.....	796 06	4,314 80	3,678 96
March.....	6,671 82	6,669 73	9,221 19
April.....	1,668 59	2,810 07	4,936 98
May.....	2,063 41	1,766 28	2,338 59
June.....	8,634 89	8,228 92	.....
July.....	3,488 27	6,214 24	.....
August.....	1,818 14	1,441 09	.....
September.....	4,933 44	7,550 64	.....
October.....	5,079 08	8,745 53	.....
November.....	477 04	872 83	.....
December.....	5,372 77	8,072 87	.....
	\$41,003 51	\$97,386 09	\$89,532 42



1873-74.

CITY DOCUMENT.

No. 103.

SECOND QUARTERLY REPORT
OF THE BOARD OF
WATER COMMISSIONERS
OF THE
CITY OF PROVIDENCE,

(Elected February 27, 1874.)

SEPTEMBER 1, 1874.



PROVIDENCE:
HAMMOND, ANGELL & CO., PRINTERS TO THE CITY.
1874.



1873-74.

CITY DOCUMENT.

No. 103.

SECOND QUARTERLY REPORT
OF THE BOARD OF
WATER COMMISSIONERS

OF THE
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(Elected February 27, 1874.)

SEPTEMBER 1, 1874.



PROVIDENCE:
HAMMOND, ANGELL & CO., PRINTERS TO THE CITY.
1874.



ORGANIZATION
OF THE
PROVIDENCE WATER WORKS.

BOARD OF WATER COMMISSIONERS.

JOSEPH J. COOKE, PRESIDENT.

CHARLES E. CARPENTER,

WILLIAM CORLISS.

SECRETARY OF THE BOARD OF WATER COMMISSIONERS.

CLINTON D. SELLEW.

Office No. 35 North Main street.

CHIEF ENGINEER.

J. HERBERT SHEDD.

Office No. 35 North Main street.



REPORT.

OFFICE OF THE BOARD OF WATER COMMISSIONERS, }
PROVIDENCE, September, 1st, 1874. }

TO THE HONORABLE THE CITY COUNCIL:

The undersigned Water Commissioners, elected February 27th, 1874, under "An ordinance to establish a Board of Water Commissioners," approved same day, respectfully present their Second Quarterly Report:

The salary of Daniel D. Waterman, Assistant Engineer, has been increased to one thousand dollars per annum, dating from July 1, 1874.

The salary of Frederic A. Arnold, Inspector of water fixtures, has been increased to twelve hundred dollars per annum, dating from August 1, 1874.

The salary of Philip S. Chase, Commissioners' clerk, has been increased to eighteen hundred dollars per annum, dating from August 1, 1874.

Walter R. Jackson, student in the engineering department, resigned June 13, 1874.

John Quinn has been appointed Engineer in charge of Hope pumping engine, with a salary of fifteen hundred dollars per annum, dating from June 23, 1874.

Joseph F. Plant has been appointed night engineer at Hope station, with a salary of ninety dollars per month, dating from August 11, 1874; Charles B. Smith, who had previously been appointed, having resigned.

On the fifteenth day of June, an offer of Thomas Phillips & Co., to furnish 20,000 pounds tin lined lead pipe, delivered in this city at 14.36 cents per pound was accepted.

On the 26th ultimo, an offer of Thomas Phillips & Co., to furnish 20,000 pounds tin lined lead pipe, delivered in this city at 14.38 cents per pound, was accepted.

An offer of Hopkins & Pomroy, to furnish 500,000 J. D. bricks, delivered on wharf in this city, at \$9.50 per thousand has been accepted.

An offer of W. A. Burdick, Agent, to furnish steps and buttresses for Sockanosset Reservoir, delivered on the Reservoir grounds, for ten hundred and forty-two $\frac{58}{100}$ dollars, (\$1,042.56) has been accepted.

An offer of the Builders' Iron Foundry to furnish six 30-inch manholes and four 30-inch blow-offs at five cents per pound, has been accepted.

The second and third stories of Breck's Building, No. 35 North Main street, occupied by the Commissioners for the last two years, have been leased for three years from 13th ultimo, at thirty-five hundred (\$3,500.) dollars per annum, including heating by steam, with a provision permitting the termination of the lease on giving three months notice, in case the city should erect a City Hall with rooms in readiness for occupancy by the Water Department.

The pumping engine at Hope station, erected by George H. Corliss, has been paid for in conformity with the instructions of the City Council.

Work on Hope Reservoir has progressed satisfactorily during the last quarter.

The walls of the engine house at Pettaconset are nearly ready for the roof. The boiler house and chimneys have been commenced. It is not intended to construct the second chimney above the walls of the boiler-house at present.

Proposals for furnishing and erecting a second pumping engine at Hope Station were opened 26th, ultimo. No decision in regard to them has yet been made.

The average daily consumption of water during the last quarter has been about 1,750,000 gallons.

Plumbers' licenses have been issued as follows:

Charles F. Disley,

Patrick McCaffrey, Jr.

The whole number of plumbers' licenses issued is forty-seven.

The following statement shows the length of pipes laid during the last quarter; the sizes of the pipes; where laid, and the totals since the commencement of the work:

30-INCH.

In Reservoir avenue, Thayer and Waterman streets,	3,052 feet.
Including 7 cut pipes, and four branches.	
Previously,	48,123 feet.
Total,	<hr/> 46,175 feet.

24-INCH.

In Waterman street,	1,816 feet.
Including 64 cut pipes, 1 branch and 2 gates,	
Previously,	21,244 feet.
Total,	<hr/> 23,060 feet.

12-INCH.

In Messer and Wayland streets,	1,280 feet.
Including 20 cut pipes, 6 branches and 1 gate.	
Previously,	24,374 feet.
Total,	25,654 feet.

8-INCH.

In Broad, Brook, Camp, Julian, McKenna, Thayer, Valley and West River streets, and in Reservoir avenue,	2,702 feet.
Including 51 cut pipes, 16 branches, 10 curved pipes, and 9 gates,	
Previously,	60,076 feet.
Total,	62,778 feet.

6-INCH.

In Bower, Charles Field, Church, Dudley, Fre- mont, Gano, George, Grove, Hope, Ives, Keene, Lawrence, Pleasant, Pitman, Power, Putnam, Sampson, Spruce, Wheaton, and West Clifford streets, and in Carrington, Humboldt and Wayland avenues; at Valley Worsted Mill and for Providence Tool Company,	16,593 feet.
Including 109 cut pipes, 48 branches, 5 curv- ed pipes, and 34 gates.	
Previously,	319,429 feet.
Total,	336,022 feet.

Total of all sizes during the last quarter, . 25,443 feet.
or 4.8187 miles.

Previously, including 10, 16, 20 and 36 inch, of which none have been laid during the last quarter,	506,446 feet.
Total,	531,889 feet.
or 100.7365 miles.	

Thirty-three fire hydrants have been set during the last quarter, one in each of the following locations :

Bower street,	north side, about half way between Ives and Governor streets.
Camp street,	north-east corner of Larch street.
Carrington avenue,	north side, about 325 feet east of Camp street.
Dudley street,	north-west corner of first street, west of Prairie avenue.
Eagle street,	east side, about 400 feet north of Atwell's avenue.
George "	north side, 195 feet west of Governor street.
Grove "	south side, about half way between Almy and Courtland streets.
Hope street,	north-west corner of Williams street.
" "	west side, about half way between Power and Charles Field streets.
Humboldt avenue,	north-east corner of Elmgrove avenue.
Ives street,	south-east corner of Amy street.
" "	" " " Front "
" "	" " " Trenton street.
" "	north-west " " Fremont "
" "	north-east " " Bird "
Julian "	north side, opposite west line of Capron street.
" "	north side, opposite west line of Sampson street.
" "	north-west corner of Kossuth street.
" "	" " " Amherst "
Keene street,	north side, about 375 feet east of Prospect street.
Lawrence "	north side, about 280 feet east of Greenwich street.
" "	north side, about 330 feet west of Broad street.

McKenna street,	north-east corner of first street north of Dart street.
Messer street,	north-east corner of Chapin avenue.
Pleasant "	north side, about 375 feet east of Camp street.
Putnam street,	west side, about 270 feet north of Sampson street.
" "	west side, about 182 feet north of Kosuth street.
" "	west side, half way between Amherst street and Atwell's avenue.
Sampson street,	north corner of Bowdoin street.
" "	" east corner of Delaine street.
Spruce "	" west " " Murphy "
Wheaton "	south-east corner of Bowen street.
" "	east side, about 120 feet north of North Court street.

The total number of fire hydrants is now seven hundred and seventy-eight.

One hydrant has also been set for use in filling sprinkling carts, etc. The number of such hydrants is now twenty-five, a portion of which can be used with a single line of hose for extinguishing fires.

The height of water in Sockanosset Reservoir at 7 o'clock this morning, was 179.30. High water in the Reservoir is 180.50 (above high tide in Providence river.)

One hundred and seventy four Ball & Fitts' water meters, made by the Union Water Meter Company, and five water meters made by Fales, Jenks & Sons, have been put in at the expense of water takers since the date of the last report. One one-inch water meter made by Fales, Jenks & Sons, was set June 2d at the expense of the city, and one one-inch water meter, of the same manufacture, previously set at the expense of the city, has been taken out

There are now sixteen hundred and fifteen water meters in use, viz :

KIND.	SIZES.						TOTALS.
	$\frac{5}{8}$ inch.	$\frac{3}{4}$ inch.	1 inch.	$1\frac{1}{2}$ inch.	2 inch.	4 inch.	
Ball & Fitts...	1,107	193	75	43	9	1	1,428
Worthington...	170	....	....	....	....	1	171
Fales, Jenks & Sons.....	....	....	16	....	....	....	16
	1,277	193	91	43	9	2	1,615

The total number of applications for a supply of water is five thousand one hundred and forty-one.

The number of service stops opened during the last quarter is four hundred and one. Two of which are for fire purposes only.

The total number of service stops opened to date is forty-two hundred and seventy-three.

Four stops have been closed during the last quarter for non-payment of bills, three of which have been re-opened on payment of the bills and a penalty in each case of two dollars, and one for reason of attendant circumstances was re-opened without charge. One stop was closed to enable the owner to set a meter; there being no stop-cock on the premises the charge of two dollars was paid at the time the request was made to have it closed; the stop has since been re-opened. Five stops previously closed for non-payment have been re-opened during the last quarter, and in each case a penalty of two dollars was paid. Twenty-seven stops closed for non-payment remain unopened. The use of one service pipe has been discontinued, but the pipe remains, in view of possible contingencies.

Water is now supplied for the following uses : —

1 armory ; 7 bakeries ; 30 banks ; 63 bar rooms ; 1 bath house ; 1 bath house,—Turkish ; 100 boarding houses ; 6 bottling establishments ; 37 building purposes ; 1 car house ; 3 carriage depositories ; 1 Christian Union ; 19 churches ; 1 city barn ; 1 city bridge,—Point street ; 1 city building ; 5 city drinking fountains ; 17 city drinking troughs ; 778 city fire hydrants ; 8 city fire steamer stations ; 2 city hose houses ; 6 club rooms ; 13 coal yards ; 1 colored shelter ; 1 conservatory of music ; 2 convents ; 1 court house ; 1 decorator ; 1 Dexter Asylum ; 1,872 dwellings of one family ; 1,496 dwellings of two families ; 131 dwellings of three families ; 150 dwellings of four families ; 18 dwellings of five families ; 27 dwellings of six families ; 4 dwellings of seven families ; 5 dwellings of eight families ; 1 dwelling of twelve families ; 2 dye houses ; 3 elevators ; 1 engine turner ; 2 engravers ; 1 express carriage-house ; 43 fire supplies,—private ; 48 fountains—private ; 1 fountain,—public ; 1 furrier ; 2,408 garden and street hydrants ; 3 gas holders ; 6 gold and silver platers ; 5 gold and silver refiners ; 2 grain elevators ; 26 green houses ; 10 halls ; 1 hall of Latter Day Saints ; 1 Home for Aged Women ; 1 hospital ; 15 hotels ; 1 infirmary ; 1 laundry ; 1 lithographer ; 3 lodging houses ; 2 lumber dealers. *Manufacturing Establishments* — 2 belt and picker ; 3 blank book ; 2 bleacheries ; 1 bologna sausage ; 1 bonnet bleachery ; 1 boot and shoe ; 1 box ; 1 braiding works ; 2 brass foundries ; 1 brewery ; 1 brush ; 2 butt ; 1 butter ; 3 carriage ; 2 cement pipe ; 1 chain ; 6 cigar ; 1 cigar box ; 16 cloak and dress ; 1 coffin ; 6 confectionery ; 1 corset ; 3 colorers of jewelry ; 7 cotton ; 1 crocus ; 1 distillery ; 3 die sinkers ; 1 dye wood ; 1 emery wheel ; 1 enamer of jewelry ; 1 eyelet ; 2 file ; 7 furniture ; 1 gas ; 1 gas burner ; 4 gas fixtures ; 1 geer ; 2 hat ; 3 harness ; 1 horse shoe ; 2 ice cream and soda water ; 1 ink ; 1 iron company ; 1 iron fence ; 8 iron foundries ; 1 Japan switch ; 1 jewelers' cards ; 75 jewelry ; 4 lapidaries ; 13 machinists ; 1 mowing machine ; 1 nail keg ; 2 oil ; 1 organ ; 1 paper box ; 1 paper collar ; 2 paper cop tube ; 1 pattern ; 3 patent med-

cine; 3 picture frame; 2 pump; 1 reed; 1 rubber tubing; 4 sash and blind; 2 screw; 1 sheet iron; 2 shirt; 3 silver ware; 5 soap; 1 spiral spring; 1 starch; 1 steam boiler; 2 steam engines; 1 stencil plate; 1 stove; 2 tanners; 1 thread; 1 tin; 4 tool; 2 top roll; 6 woolen goods; 1 yeast. *Markets*—36 fish; 87 meat. *Mills*—2 drug and grain; 3 flour and grain; 5 marble works; 1 paint; 9 planing. 1 Music Hall; 1 nickel plater; 16 not classed; 3 Odd Fellows' halls; 1 opera house; 2 Orphan Asylums; 5 organs; 5 oyster houses; 470 offices; 9 photographers; 6 plaster and stucco workers; 8 plumbers; 5 police stations; 10 printing establishments; 9 provision curers and packers; 7 railroads; 1 reading room; 39 restaurants; 1 roofer. *Saloons*.—5 billiard; 3 bowling; 5 ice cream; 12 lager beer; 9 oyster. *Schools*.—1 boarding; 12 private; 31 public; 1 reform. *Shops*.—33 barber; 6 blacksmith; 11 carpenter; 3 cooper; 1 junk; 12 paint; 5 shoemaker; 21 tailor; 5 tinman. *Stables*.—6 hack; 39 livery; 207 private; 3 sale; 59 work. 13 steamboats; 13 steamships; 5 steam and gas-pipe fitters. *Stores*.—1 agricultural implements; 35 apothecary; 1 auction; 4 book; 27 boot and shoe; 1 carpet; 2 carriage trimmings; 11 cigar; 17 clothing; 7 confectionery; 3 drug; 38 dry goods; 80 fancy goods; 9 flour and grain; 11 fruit; 10 furniture; 9 gents' furnishing goods; 105 grocery,—retail; 15 grocery,—wholesale; 7 hardware; 2 hide and leather; 2 hoop skirt; 10 house furnishing goods; 4 house paper; 3 iron and steel; 10 jewelry; 11 liquor; 1 lime and brick; 2 manufacturers' supplies; 30 millinery; 9 newspaper; 3 oil and paint; 2 paper and paper stock; 1 piano forte; 7 produce,—wholesale; 3 sewing machines; 4 stationery; 2 stove; 3 tea; 2 trunk; 1 umbrella; 1 wooden ware; 1 wool; 2 woolen goods. 1 State Prison; 1 storehouse; 4 undertakers; 1 United States Custom House building; 2 upholsterers; 2 water boats; 1 wheelwright; 1 wood turner; 3 wood yards.

The amount of expenditures during the last quarter, is - - - - \$346,885 07

The total amount of expenditures, is	-	3,696,126	47
The total amount of appropriations, is	-	3,800,000	00
The unexpended balance, is	-	103,873	53
The amount received during the last quarter, all of which has been paid to the City Treasurer, is			
For water supplies,	-	\$18,293	23
For water meters,	-	4,336	75
For penalties,	-	18	00
For sundries,	-	2,809	24
			<hr/>
			25,457 22
The amount received for water in 1872, was		41,003	51
The amount received for water in 1873, was		97,386	09
The amount received for water during the first eight months of 1874, is	-	107,825	65
The total amount received for water to date, is		246,215	25
The amount of all receipts to date, is	-	384,404	77.

An additional appropriation will probably be needed before the close of the present quarter.

A schedule of bills approved during the last quarter, and of receipts during the same time, and a trial balance of ledger, August 31, 1874, are hereunto appended and made parts of this report.

A separate report of that portion of the duties of the Board which relates to sewers, will be presented.

JOSEPH J. COOKE,	}	<i>Board of Water Commissioners.</i>
CHAS. E. CARPENTER,		
WILLIAM CORLISS,		

SCHEDULE OF BILLS APPROVED BY THE BOARD OF WATER COMMISSIONERS FROM JUNE 1, 1874, TO AUGUST 31, 1874, INCLUSIVE.

330	Schooner J. B. Norris, freight of bricks, (charged to S. F. & J. A. Gray,) - - -	\$60 00
331	Schooner Sarah R. Thomas, freight of water pipes, (charged to Gloucester Iron Works,) - - -	834 31
332	Schooner Sarah R. Thomas, freight of water pipes, (charged to Gloucester Iron Works,) - - -	785 24
333	Samuel M. Gray, paid by him for labor at Pettaconset, - - -	6,219 82
334	Samuel M. Gray, on account for payment for labor at Pettaconset, - - -	600 00
335	Samuel M. Gray, paid by him for labor at Hope Pumping Station, - - -	66 75
336	Lobdell & Newmans, on account for construction of Hope Reservoir, - - -	8,350 00
337	Paulding, Kemble & Co., wrought iron cross heads, - - -	2,006 40
338	G. B. & W. F. Inman, carting pipes, - - -	1,293 94
339	Angell & Lansing, lumber, - - -	1,071 38
340	Lobdell & Newmans, extra labor and materials at Hope Pumping Station, - - -	1,528 66
341	Ira Mathewson, extending lightning rods at Hope Engine House, - - -	52 50
342	Congdon, Carpenter & Co., iron, bolts, &c., - - -	40 90
343	Daniel F. Burlingame, repairing tools, &c., - - -	70 47
344	G. B. & W. F. Inman, trenching and back-filling and laying water pipes, - - -	2,400 00
345	Paulding, Kemble & Co., on account for constructing pumping engine, - - -	9,585 00
346	W. A. Burdick, Agent, granite, - - -	1,728 00
347	W. A. Burdick, Agent, granite, - - -	2,425 00
348	Hopkins & Pomroy, coal, cement, carting bricks, &c., - - -	3,705 96
349	Olney Brothers, oil, - - -	79 44
350	W. Coleman & Sons, sheaves, - - -	8 50
351	M. D. Copeland, carting bricks to Pettaconset, - - -	194 00
352	Snow & Lewis, cement, - - -	545 00
353	Gloucester Iron Works, cast iron water pipes, - - -	9,194 42
354	Steamer E. A. Woodward, freight of water pipes, (charged to Warren Foundry and Machine Co.,) - - -	304 59
355	S. F. & J. A. Gray, bricks, - - -	400 00
356	Dexter Gorton & Co., carpenters' work, lumber, &c., - - -	829 29
357	Hammond, Angell & Co., printing, - - -	331 38
358	Warren Foundry and Machine Co., cast iron water pipes, - - -	12,203 37
359	Fuller Iron Works, special castings, - - -	411 48
360	Builders' Iron Foundry, special castings, - - -	218 88
	Amount carried forward, - - -	\$67,544 68

	Amount brought forward,	-	-	\$67,544 08
361	George W. Smith, cutting curbstones for hydrant boxes,	-	-	14 00
362	Charles H. Pierce, paid by him for labor,	-	-	403 89
363	G. B. & W. F. Inman, setting fire hydrants, &c.,	-	-	127 50
364	G. B. & W. F. Inman, on account of reservation in bill for laying water pipes in 1873,	-	-	2,000 00
365	George H. Corliss, pumping engine, &c., at Hope Pumping Station, (approved by direction of the City Council,)	-	-	54,708 16
366	Frederic Graff, professional services and expenses as member of committee to test pumping engines, (approved by virtual direction of the City Council,)	-	-	2,000 00
367	Erastus W. Smith, professional services and expenses as member of committee, to test pumping engines, (approved by virtual direction of the City Council,)	-	-	1,500 00
368	George H. Reynolds, professional services and expenses as member of committee to test pumping engines, (approved by virtual direction of the City Council,)	-	-	1,500 00
369	Schooner Sarah R. Thomas, freight of water pipes, (charged to Gloucester Iron Works,)	-	-	801 48
370	Charles H. Pierce, salary as assistant engineer,	-	-	230 00
371	Samuel M. Gray, " " " " &c.,	-	-	335 00
372	Charles H. Swan, " " " " -	-	-	166 67
373	Otis F. Clapp, " " " " -	-	-	208 33
374	Howard A. Carson, " " " " -	-	-	208 33
375	William T. Schneider, " " " " -	-	-	100 00
376	C. Frank Allen, " " " " -	-	-	100 00
377	John E. Bowen, " " " " -	-	-	100 00
378	Lucius J. Sampson, " " " " -	-	-	100 00
379	George H. Slade, " " " " -	-	-	83 33
380	Daniel D. Waterman, " " " " -	-	-	66 67
381	Lepilete Sweet, 2d, " " " " -	-	-	83 33
382	Edmund B. Weston, " " " " -	-	-	83 33
383	Henry N. Francis, " " " " -	-	-	83 33
384	William F. Janes, " " service pipe engineer,	-	-	83 33
385	Augustus F. Nagle, " " mechanical " -	-	-	200 00
386	Walter R. Jackson, " " student, engineering department	-	-	18 06
387	Edwin P. Dawley, " " " " " -	-	-	35 00
388	Charles M. Hunt, " " " " " -	-	-	33 33
389	Frank B. Ferris, " " " " " -	-	-	33 33
390	Thomas L. Botts, " " " " " -	-	-	33 33
391	William H. Olmstead, " " " " " -	-	-	33 33
392	William M. Brown, Jr., " " " " " -	-	-	41 67
393	Daniel C. Stone, " " " " " -	-	-	41 67
394	Alfred E. Martin, " " " " " -	-	-	25 00
395	George B. Francis, " " " " " -	-	-	25 00
396	Charles A. Harper, salary as student, engineering department, -	-	-	10 00
397	Walter F. Slade, salary as service pipe clerk, -	-	-	83 33
398	William Aplin, " " clerk, engineering department, -	-	-	83 33
399	William H. Turner, salary as clerk, engineering department,	-	-	100 00

Amount carried forward,

\$133,447 74

REPORT OF THE WATER COMMISSIONERS.

17

	Amount brought forward,	-	\$133,447 74
400	Andrew B. Purdy, salary as superintendent of pipe work,	-	166 67
401	George Bowers, " " inspector on pipe line,	-	104 00
402	S. Horace Wheeler, " " " of service pipes,	-	125 00
403	Henry M. Wilcox, " " assistant inspector of service pipes,	-	100 00
404	Samuel R. Eccleston, salary as inspector of pipes,	-	130 00
405	Foster S. Dennis, Jr., " " " " " "	-	104 00
406	Burrows Chace, " " " at Hope Reservoir,	-	130 00
407	Richard K. Randolph, " " " " " "	-	130 00
408	Alexis C. Miller, " " " " " "	-	105 00
409	George W. Mitchell, " " " " " "	-	115 00
410	Rencellaer B. S. Hart, " " " " " "	-	17 69
411	Frederic A. Arnold, " " " of water fixtures,	-	83 33
412	William G. Budlong, " " " " meters,	-	83 33
413	Irving H. Potter, " " temporary assistant, engineering department,	-	50 00
414	Edward F. Jeffers, salary as temporary assistant, engineering department,	-	25 50
415	Louis W. Peck, salary as temporary assistant, engineering department,	-	60 00
416	Frank E. Wiggin, salary as temporary assistant, engineering department,	-	36 00
417	Henry G. Dennis, salary as superintendent of pipe yard,	-	125 00
418	Richard M. Wood, " " clerk at pipe yard,	-	66 67
419	Jeptha Baker, " " keeper of Sockanosset Reservoir,	-	77 50
420	George F. Battey, " " pumping engineer, Pettacomet,	-	100 00
421	John Quinn, " " " Hope Station,	-	33 33
422	John Hamilton, " " fireman, Pettacomet,	-	80 00
423	George F. Barney, " " " " "	-	60 00
424	George H. DeForest, salary as time keeper at Hope Reservoir,	-	94 50
425	William F. Tanner, salary as axeman,	-	50 20
426	Frank U. Carter, testing cement,	-	29 25
427	William H. Kelly, testing cement,	-	5 25
428	Everett L. Belcher, " " "	-	16 25
429	Leonard N. Austin, Jr., salary as commissioners' clerk,	-	66 67
430	Thomas C. Gushee, " " " " "	-	100 00
431	Phillip S. Chase, " " " " "	-	125 00
432	Clinton D. Sellew, " " secretary of water commissioners,	-	200 00
433	George F. Johnson, care of rooms,	-	56 80
434	Samuel M. Gray, horse hire and paid by him for sundries,	-	95 43
435	Clinton D. Sellew, paid by him for sundries,	-	25 39
436	Gladding Bros. & Tibbits, stationery,	-	82 66
437	Akerman & Co., blank books, &c.,	-	42 55
438	Baker & Howe, office furniture,	-	76 58
439	Moulton & Ingraham, stakes and wedges,	-	10 08
440	Henry Cram, window shades and fixture,	-	8 10
441	Newport Manufacturing Co., couplings,	-	11 81

Amount carried forward, - \$186,652 28

	Amount brought forward,	-	\$136,652 28
442	W. Coleman & Sons, blocks,	-	28 00
443	Edward L. Tracey, use of carpenters' tools,	-	13 00
444	Charles H. George & Co., pig lead and iron box,	-	50 92
445	George W. Hall & Co., sand screen,	-	6 50
446	Henry R. Worthington, labor and materials on Worthington engine,	-	853 29
447	Providence Steam and Gas Pipe Co., clips, &c.,	-	93 12
448	A. C. Eddy & Studleys, rubber packing, tubing, &c.,	-	48 57
449	Charles H. Pierce, paid by him for sundries,	-	136 48
450	Charles H. Pierce, " " " " labor,	-	1,146 40
451	Union Water Meter Co., water meters,	-	1,116 25
452	Abbott Lawrence, expressages of meters,	-	4 50
453	George W. Smith, cutting curbstones for hydrant boxes,	-	8 00
454	Wm. H. Miller & Co., repairing tools, &c.,	-	59 68
455	Providence Steam Engine Co., examination of boilers, &c.,	-	17 50
456	Providence Gas Co., gas,	-	197 11
457	Wood & Winsor, machinists' labor, pipe, fittings, &c.,	-	167 94
458	Steamer E. A. Woodward, freight of water pipes, (charged to Warren Foundry and Machine Co.,)	-	246 18
459	Charles H. Parkhurst, counsel fees,	-	400 00
460	S. F. & J. A. Gray, bricks,	-	300 96
461	G. B. & W. F. Inman, trenching and back-filling and laying water pipes,	-	2,000 00
462	G. B. & W. F. Inman, balance of reservation for trenching and back-filling and laying water pipes in 1873,	-	500 00
463	Paulding, Kemble & Co., on account for constructing pumping engine,	-	14,145 00
464	M. D. Copeland, carting pipes,	-	47 45
465	Samuel M. Gray, paid by him for labor at Pettaconset,	-	7,698 04
466	Samuel M. Gray, " " " " " " Hope Pumping Station,	-	100 74
467	Charles H. Pierce, paid by him for labor,	-	118 96
468	Bugbee & Hall, tracing cloth, &c.,	-	47 75
469	Valpey, Angell & Co., stationery,	-	4 05
470	Providence & Newport Lead Works, tin lined lead pipe, &c.,	-	266 05
471	Providence Builders' Association, cement,	-	89 18
472	Wood & Winsor, labor, pipe, fittings, &c.,	-	21 14
473	Daniel F. Burlingame, repairing tools, &c.,	-	94 03
474	G. B. & W. F. Inman, carting pipes,	-	1,426 15
475	G. B. & W. F. Inman, setting fire hydrants, repairing streets, &c.,	-	97 50
476	W. A. Burdick, Agent, granite,	-	44 43
477	W. A. Burdick, Agent, " "	-	1,890 00
478	Lobdell & Newmans, on account for construction of Hope Reservoir,	-	11,000 00
479	Builders' Iron Foundry, special castings,	-	2,003 03
480	Hopkins & Pomroy, coal, lime, carting bricks, &c.,	-	2,487 60
481	John A. Moore, carting cement, bricks, &c.,	-	68 68
	Amount carried forward,	-	\$185,696 46

	Amount brought forward,	-	-	\$185,696 48
482	Samuel M. Gray, on account for payments for labor at Pettaconset,	-	-	600 00
483	Lobdell & Newmans, extra labor and materials at Hope Pumping Station,	-	-	2,241 60
484	Benjamin L. Spencer, services as engineer at Hope Pumping Station,	-	-	26 00
485	Charles Mitchell, services as fireman, at Hope Pumping Station,	-	-	46 75
486	Thomas Miller, services as fireman at Hope Pumping Station,	-	-	14 67
487	Warren Foundry and Machine Co., cast iron water pipes,	-	-	13,477 23
488	Gloucester Iron Works,	-	-	18,415 42
489	Charles H. Pierce, paid by him for labor,	-	-	263 65
490	Dexter Gorton & Co., carpenters' work, lumber, &c.,	-	-	1,434 56
491	Wm. H. Miller & Co., blacksmiths' work on tools, &c.,	-	-	51 33
492	Fuller Iron Works, special castings and valve boxes,	-	-	1,712 54
493	C. E. Jencks, labor, lumber, &c.,	-	-	7 56
494	W. A. Burdick, Agent, granite,	-	-	804 03
495	Thomas Phillips & Co., tin lined lead pipe,	-	-	301 99
496	Thomas Phillips & Co., " " " "	-	-	2,886 50
497	Steamer E. A. Woodward, freight of water pipes, (charged to Warren Foundry and Machine Co.,)	-	-	316 10
498	W. A. Burdick, Agent, granite,	-	-	4,105 00
499	W. A. Burdick, Agent, " "	-	-	870 00
500	W. A. Burdick, Agent, granite,	-	-	6,140 00
501	Schooner J. C. Thompson, freight of water pipes, (charged to Gloucester Iron Works,)	-	-	579 01
502	Taunton Brick Co., on account for bricks,	-	-	3,000 00
503	G. G. Hicks, labor bending ties,	-	-	84 38
504	City of Providence, Sewer Department, sewer pipes and rings, manhole-frames and covers and bricks,	-	-	561 33
505	Paulding, Kemble & Co., piston rod, pump rod and beam centres,	-	-	2,270 58
506	Steamer E. A. Woodward, freight of water pipes, (charged to Warren Foundry and Machine Co.,)	-	-	134 98
507	Charles H. Pierce, salary as assistant engineer,	-	-	260 00
508	Samuel M. Gray, " " " " &c,	-	-	335 00
509	Charles H. Swan, " " " " "	-	-	166 67
510	Otis F. Clapp, " " " " "	-	-	208 33
511	Howard A. Carson, " " " " "	-	-	208 33
512	William T. Schneider, salary as assistant engineer,	-	-	100 00
513	C. Frank Allen, " " " " "	-	-	100 00
514	John E. Bowen, " " " " "	-	-	100 00
515	Lucius J. Sampson, " " " " "	-	-	100 00
516	George H. Slade, " " " " "	-	-	83 33
517	Daniel D. Waterman, " " " " "	-	-	83 33
518	Lepriete Sweet, 2d, " " " " "	-	-	83 33
519	Edmund B. Weston, " " " " "	-	-	83 33
520	Henry N. Francis, " " " " "	-	-	83 33
521	William F. Janes, " " service pipe engineer,	-	-	83 33
522	Augustus F. Nagle, " " mechanical "	-	-	200 00
523	Edwin P. Dawley, " " student, engineering department,	-	-	41 67
	Amount carried forward,	-	-	\$248,351 65

	Amount brought forward,	-	-	-	\$249,351 65
524	Charles M. Hunt, salary as student, engineering department,	-	-	-	33 33
525	Frank B. Ferris, " " " " " "	-	-	-	33 33
526	Thomas L. Botts, " " " " " "	-	-	-	33 33
527	William H. Olmstead, salary as student, engineering department,	-	-	-	33 33
528	William M. Brown, Jr., salary as student, engineering department,	-	-	-	41 67
529	Daniel C. Stone, salary as student, engineering department,	-	-	-	41 67
530	George B. Francis, " " " " " "	-	-	-	25 00
531	Charles A. Harper, " " " " " "	-	-	-	25 00
532	Charles E. Shedd, " " " " " "	-	-	-	15 32
533	Walter F. Slade, " " service pipe clerk, engineering department,	-	-	-	83 33
534	William Aplin, salary as clerk, engineering department,	-	-	-	83 33
535	Wm. H. Turner, " " " " " "	-	-	-	100 00
536	Irving H. Potter, " " " " " "	-	-	-	46 00
537	Andrew B. Purdy, salary as superintendent of pipe work,	-	-	-	166 67
538	George Bowers, " " inspector on pipe line,	-	-	-	108 00
539	S. Horace Wheeler, " " " of service pipes,	-	-	-	125 00
540	Henry M. Wilcox, " " assistant inspector of service pipes,	-	-	-	100 00
541	Samuel R. Eccleston, salary as inspector of pipes,	-	-	-	135 00
542	Foster S. Dennis, Jr., " " " " " "	-	-	-	108 00
543	Burrows Chace, " " " at Hope Reservoir,	-	-	-	130 00
544	Richard K. Randolph, salary as inspector at Hope Reservoir,	-	-	-	130 00
545	Alexis C. Miller, " " " " " "	-	-	-	105 00
546	George W. Mitchell, " " " " " "	-	-	-	115 00
547	Rencellaer B. S. Hart, salary as inspector at Hope Reservoir,	-	-	-	115 00
548	Frederic A. Arnold, salary as inspector of water fixtures,	-	-	-	83 33
549	William G. Budlong, " " " " meters,	-	-	-	83 33
550	Mark Wilmarth, " " temporary assistant, engineering department,	-	-	-	69 89
551	Frank E. Wiggins, salary as temporary assistant, engineering department,	-	-	-	36 00
552	Edward F. Jeffers, salary as temporary assistant, engineering department,	-	-	-	22 50
553	J. H. O. Smith, salary as temporary assistant, engineering department,	-	-	-	14 00
554	Edgar F. Ballou, salary as temporary assistant, engineering department,	-	-	-	12 00
555	Henry G. Dennis, salary as superintendent of pipe yard,	-	-	-	125 00
556	Richard M. Wood, " " clerk at pipe yard,	-	-	-	66 67
557	Jeptha Baker, " " keeper of Sockanosset Reservoir,	-	-	-	75 00
558	George F. Battey, " " pumping engineer, Pettaconset,	-	-	-	100 00
559	John Hamilton, " " fireman,	-	-	-	80 00
560	George F. Barney, " " " " " "	-	-	-	60 00
561	John Quinn, " " pumping engineer, Hope Station,	-	-	-	125 00
562	Charles B. Smith, " " night " " " "	-	-	-	100 00
	Amount carried forward,	-	-	-	\$251,336 68

	Amount brought forward,	-	-	\$251,336 68
563	Thomas Miller, salary as fireman, Hope Station	-	-	65 00
564	Michael Hamill, " " " "	-	-	46 13
565	Geo. H. DeForest, " " time keeper at Hope Reservoir,	-	-	81 00
566	William F. Tanner, " " axeman,	-	-	41 80
567	Frank U. Carter, testing cement,	-	-	24 75
568	Everett L. Belcher, " " " "	-	-	13 75
569	Leonard N. Austin, Jr., salary as commissioners' clerk,	-	-	66 67
570	Thomas C. Gushee, " " " "	-	-	100 00
571	Phillip S. Chase, " " " "	-	-	125 00
572	Clinton D. Sellew, " " secretary of water com- missioners,	-	-	200 00
573	John Purnell, care of rooms,	-	-	10 00
574	Charles H. Pierce, paid by him for sundries,	-	-	73 47
575	Charles H. Pierce, paid by him for labor,	-	-	1,091 00
576	Samuel M. Gray, horse hire and paid by him for sundries,	-	-	86 00
577	Union Water Meter Co., water meters,	-	-	1,652 87
578	A. Lawrence, expressages of meters,	-	-	4 00
579	Henry Holden, horse shoeing,	-	-	7 25
580	Providence Steam Engine Co., labor of engineer, &c.,	-	-	81 75
581	W. Coleman & Sons, blocks, &c.,	-	-	22 50
582	John Heathcote & Co., tools for reaming meters,	-	-	5 00
583	Providence Power Cement Drain Pipe Co., cement pipe,	-	-	5 76
584	Tingley Marble Company, rubbing bricks,	-	-	37 60
585	J. L. Pierce & Co., oil,	-	-	88 38
586	J. B. Handy, repairing wagon,	-	-	12 00
587	Ezra I. Walker, painting wagon,	-	-	16 00
588	William S. Briggs, horse hire, by engineers,	-	-	12 00
589	D. E. Howard, care of rooms,	-	-	7 39
590	W. Congdon & Sons, steel tape, &c.,	-	-	36 40
591	Tuttle & Hobbs, horse keeping, &c.,	-	-	140 14
592	G. W. Edmunds, repairing wagon,	-	-	19 76
593	A. O. Eddy & Studleys, packing rings, hose, &c.,	-	-	36 75
594	Samuel M. Gray, on account for payments for labor at Pet- taconset,	-	-	200 00
595	Schooner Henry Allen, freight of water pipes, charged to Gloucester Iron Works,) -	-	-	589 55
596	G. B. & W. F. Inman, trenching and back-filling and laying water pipes,	-	-	4,450 00
597	G. B. & W. F. Inman, carting pipes,	-	-	1,099 14
598	Alva Carpenter, valve covers and grated inlets,	-	-	134 03
599	Kinnecom & Co., use of derrick,	-	-	78 00
600	Samuel M. Gray, paid by him for labor at Pettaconset,	-	-	8,564 08
601	Samuel M. Gray, " " " " " Hope Pumping Station,	-	-	91 22
602	Samuel M. Gray, on account for payments for labor at Pet- taconset,	-	-	2,400 00
603	Lobdell & Newmans, extra labor and materials at Hope Pumping Station,	-	-	840 13
604	Lobdell & Newmans, on account for construction of Hope Reservoir,	-	-	11,450 00
	Amount carried forward,	-	-	\$285,442 95

	Amount brought forward,	-	-	-	\$285,442 95
605	W. A. Burdick, Agent, granite,	-	-	-	565 00
606	W. A. Burdick, Agent,	-	-	-	2,835 00
607	W. A. Burdick, Agent,	-	-	-	2,465 00
608	W. A. Burdick, Agent,	-	-	-	177 20
609	Daniel F. Burlingame, repairing tools, &c.,	-	-	-	108 20
610	Dexter Gorton & Co., lumber, carpenter's work, &c.,	-	-	-	1,064 27
611	M. D. Copeland, teaming,	-	-	-	21 20
912	Fuller Iron Works, special castings and valve boxes,	-	-	-	1,501 89
613	Builders' Iron Foundry, special castings and pipe bolts,	-	-	-	1,761 77
614	Prov. Builders' Association, cement,	-	-	-	409 50
615	Louis W. Clarke, repairing telegraph line,	-	-	-	5 10
616	Edward L. Tracy, use of carpenters' tools,	-	-	-	13 00
617	Hopkins & Pomroy, coal, lime, carting bricks, &c.,	-	-	-	1,520 11
618	G. B. & W. F. Inman, setting fire hydrants, repairing streets, &c.,	-	-	-	76 80
619	Paulding, Kemble & Co., on account for constructing pump- ing engine,	-	-	-	12,905 00
620	Gloucester Iron Works, cast iron water pipes,	-	-	-	9,625 20
621	T. & W. Breck, rent of offices, &c.,	-	-	-	752 80
622	Charles H. Pierce, paid by him for labor,	-	-	-	315 49
623	Hopkins & Pomroy, cement, carting bricks, &c.,	-	-	-	8 27
624	Charles B. Smith, salary as night engineer, Hope Pumping Station,	-	-	-	32 26
625	W. Coleman & Sons, double blocks,	-	-	-	34 00
626	W. P. Knickerbocker & Co., manilla rope,	-	-	-	33 25
627	Snow & Lewis, cement,	-	-	-	109 00
628	Schooner J. C. Thompson, freight of water pipes, (charged to Gloucester Iron Works,)	-	-	-	304 98
629	Warren Foundry and Machine Co., cast iron water pipes,	-	-	-	10,868 97
630	Thomas J. Hill, rent of wharf, &c.,	-	-	-	808 33
631	J. Herbert Shedd, salary as chief engineer,	-	-	-	2,000 00
632	Charles H. Pierce, " " assistant engineer,	-	-	-	250 00
633	Samuel M. Gray, " " " " &c.,	-	-	-	335 00
634	Charles H. Swan, " " " " " "	-	-	-	125 00
635	Otis F. Clapp, " " " " " "	-	-	-	208 33
636	Howard A. Carson, " " " " " "	-	-	-	208 33
637	William T. Schneider, salary as assistant engineer,	-	-	-	100 00
638	C. Frank Allen, " " " " " "	-	-	-	100 00
639	John E. Bowen, " " " " " "	-	-	-	100 00
640	Lucius J. Sampson, " " " " " "	-	-	-	100 00
641	George H. Slade, " " " " " "	-	-	-	83 33
642	Daniel D. Waterman, " " " " " "	-	-	-	83 33
643	Lepriete Sweet, 2d, " " " " " "	-	-	-	83 33
644	Edmund B. Weston, " " " " " "	-	-	-	83 33
645	Henry N. Francis, " " " " " "	-	-	-	83 33
646	William F. Janes, " " service pipe engineer,	-	-	-	83 33
647	Augustus F. Nagle, " " mechanical engineer,	-	-	-	100 00
648	Edwin P. Dawley, " " student engineering depart- ment,	-	-	-	41 67
	Amount carried forward,	-	-	-	\$337,822 25

REPORT OF THE WATER COMMISSIONERS.

23

Amount brought forward,		\$337,822 25
649	Charles M. Hunt, salary as student engineering department,	33 33
650	Frank B. Ferris, " " " " "	33 33
651	Thomas L. Botts, " " " " "	33 33
652	Wm. H. Olmstead, " " " " "	33 33
653	Wm. M. Brown, Jr., " " " " "	41 67
654	Daniel C. Stone, " " " " "	41 67
655	George B. Francis, " " " " "	25 00
656	Charles A. Harper, " " " " "	25 00
657	Charles E. Shedd, " " " " "	25 00
658	Walter F. Slade, " " service pipe clerk, engineering department,	83 33
659	William Aplin, salary as clerk, engineering department,	83 33
660	William H. Turner, salary as clerk, engineering department,	100 00
661	Irving H. Potter, " " " " "	38 20
662	Andrew B. Purdy, " " superintendent of pipe work,	166 67
663	George Bowers, " " inspector on pipe line,	104 00
664	Foster S. Dennis, Jr., " " " " " &c.,	104 00
665	S. Horace Wheeler, salary as inspector of service pipe,	125 00
666	Henry M. Wilcox, " " assistant inspector of service pipe,	100 00
667	Samuel R. Eccleston, salary as inspector of pipes,	130 00
668	Burrows Chace, " " " at Hope Reservoir,	130 00
669	Richard K. Randolph, " " " " " "	130 00
670	Alexis C. Miller, " " " " " "	105 00
671	George W. Mitchell, " " " " " "	115 00
672	Rencellaer B. S. Hart, " " " " " "	115 00
673	Frederic A. Arnold, " " " of water fixtures,	100 00
674	William G. Budlong, " " " " water meters,	83 33
675	Mark Wilmarth, " " temporary assistant, engineering department,	83 33
676	Frank E. Wiggins, salary as temporary assistant, engineering department,	40 50
677	J. H. C. Smith, salary as temporary assistant, engineering department,	54 00
678	Edgar F. Ballou, salary as temporary assistant, engineering department,	20 48
679	George W. Winsor, Jr., salary as temporary assistant, engineering department,	39 00
680	Charles H. Wheeler, salary as temporary assistant, engineering department,	24 00
681	Henry G. Dennis, salary as superintendent of pipe yard,	125 00
682	Richard M. Wood, " " clerk at pipe yard,	66 67
683	Jeptha Baker, salary as keeper of Sockanosset Reservoir,	77 50
684	George F. Battey, salary as pumping engineer, Pettaconset,	100 00
685	John Hamilton, " " fireman, " "	80 00
686	George F. Barney, " " " " "	60 00
687	John Quinn, " " pumping engineer, Hope Station,	125 00
688	Joseph F. Plant, " " night " " "	60 97
689	Thomas Miller, " " fireman " " "	65 00
690	Michael Hamill, " " " " " "	65 00

Amount carried forward,

\$341,013 22

	Amount brought forward,		\$341,013 22
691	George H. DeForest, salary as time keeper at Hope Reservoir,		72 30
692	William F. Tanner, " " axeman, " "		50 40
693	Frank U. Carter, testing cement, .		60 75
694	Everett L. Belcher, " " .		33 75
695	William H. Kelley, " " .		15 00
696	Leonard N. Austin, Jr., salary as commissioners' clerk, .		66 67
697	Thomas C. Gushee, " " " "		100 00
698	Philip S. Chase, . " " " "		150 00
699	Clinton D. Sellew, salary as secretary of water commis- sioners, .		200 00
700	Joseph J. Cooke, salary as water commissioner, .		500 00
701	Charles E. Carpenter, salary as water commissioner, .		500 00
702	William Corliss, " " " "		500 00
703	John Purnell, care of rooms, .		57 89
704	Charles H. Pierce, paid by him for labor, .	1,028 38	
705	Charles H. Pierce, paid by him for sundries, .		58 96
706	Samuel M. Gray, horse hire and paid by him for sundries, .		92 52
707	F. S. Dennis, Jr., expenses to Phillipsburg and return, &c., .		36 00
708	Providence Steam Engine Co., machinists' labor, .		80 50
709	Moulton & Ingraham, stakes, .		9 48
710	Providence & Newport Lead Works, pig tin, &c., .		13 51
711	Caleb S. Mann, balance in exchange of meters, .		13 35
712	John W. Mathewson & Co., granite, .		15 90
713	Boston Machine Co., post hydrant, .		45 00
714	John H. Eddy, pails, brooms, &c., .		33 97
715	Wm. H. Miller & Co., blacksmiths' work on tools, &c., .		177 55
716	Abbott Lawrence, expressages of meters, .		6 26
717	Mason, Chapin & Co., lamp black, oil, &c., .		73 16
718	John Mason, making patterns, &c., .		29 14
719	Providence & Newport Lead Works, lead, .		38 47
720	Bugbee & Hall, tracing paper, &c., .		42 50
721	Gladding Bros. & Tibbitts, stationery, .		74 04
722	W. J. Glover, felting, .		12 96
723	M. D. Copeland, teaming, .		15 34
724	G. & C. P. Hutchins, oil, chimneys, &c., .		30 00
725	Union Water Meter Co., water meters, .		1,638 10
			<hr/>
			\$346,885 07

RECEIVED FROM JUNE 1, 1874, TO AUGUST 31, 1874, INCLUSIVE,
AND PAID TO THE CITY TREASURER.

1874.

June,	2. Of Fuller Iron Works, for old iron, . . .	\$523 19
	5. Of John Smurtherst, for three months' rent of farm in Warwick, purchased of Richard U. Rhodes and wife, to September 1, 1874, . . .	56 25
	8. Of Samuel M. Gray, for sundries, . . .	9 31
	12. Of Daniel M. Lufkin, for one month's rent of farm in Warwick, purchased of Miss Patience W. Chace, to June 12, 1874, . . .	14 58
	27. Of Peleg P. Cranston, for three months' rent of "Ran- dall Estate," so called, in Pawtuxet, to July 1, 1874, . . .	50 00
	29. Of Stafford & Co., for six months rent of Pawtuxet Mill, to July 1, 1874, . . .	400 00
	30. Of Alva Carpenter, for old iron, . . .	52 75
July	11. Of Daniel M. Lufkin, for one months' rent of farm in Warwick, purchased of Miss Patience W. Chace, to July 12, 1874, . . .	14 58
	25. Of City of Providence, for sewer expenses, . . .	27 35
	27. Of Loring & Wales, for wharfage, cartage and labor, . . .	12 75
August	4. Of Baxter Hill, for soil, . . .	5 50
	7. Of City of Providence, for sewer expenses, . . .	730 53
	11. Of Daniel M. Lufkin, for one months rent of farm in Warwick, purchased of Miss Patience W. Chace, to August 12, 1874, . . .	14 58
	31. For couplings for street sprinklers, during the pres- ent quarter, . . .	2 30
	For repairing meters during the present quarter, . . .	68 36
	For laying service pipes during the present quarter, . . .	683 05
	For service pipe during the present quarter, . . .	144 14
	For water during the present quarter, . . .	18,293 23
	For meters during the the present quarter, . . .	4,336 75
	For penalties during the present quarter, . . .	18 00
		<hr/>
		\$25,457 22

TRIAL BALANCE OF LEDGER, AUGUST 31, 1874.

Dr.

Hope Reservoir, for land,	\$124,122 80
" " sundries,	1,461 37
" " labor,	5,852 99
" " gate chambers,	8,768 72
" " drain,	404 03
" " inspection,	5,014 09
" " conduit,	2,761 28
" " slope wall,	592 56
Hope engine house,	108,019 87
" " for lights,	641 70
Hope pumping station, for coal and wood,	3,351 68
" " sundries,	385 53
Night and Sunday watch at Hope engine house,	41 22
Hope pumping station, for engineer,	502 56
" " fireman,	302 55
Sockanosset Reservoir, for construction,	177,870 72
" " sundries,	4,690 42
" " land,	16,074 35
" " watch,	2,416 75
" " gate houses,	18,590 28
" " drain,	2,421 13
" " inspection,	6,819 18
" " extra work and materials,	189 70
" " gate chambers,	19,399 27
" " improvement of grounds,	1,011 37
Line of leading mains, for labor and materials,	19,810 10
" " extra trenching, etc.,	305 95
" " land and damages,	1,665 00
Force main line, for land and damages,	2,006 35
" " labor and materials,	5,099 28
" " extra trenching, etc.,	322 56
Office furniture, stoves, gas fixtures, etc.,	1,947 39
Rent of offices,	3,950 00
Books, stationery, etc.,	1,001 25
Fuel and lights,	271 55
Horse hire by commissioners,	19 00
Traveling expenses of commissioners,	146 87
Janitor of rooms,	780 00
Clerks' salaries,	8,124 53
Commissioners' salaries,	29,708 78
Secretary's salary,	4,986 71
Sundries,	501 20
Printing,	2,365 35
Advertising,	1,815 92
Fences,	2,050 28
Stop valves,	58,306 72
Store house, work shop, and meter testing room,	1,407 26
Rent of wharves and pipe yards,	5,361 50
Linking curved pipes,	322 75
Amount carried forward,	\$658,942 87

REPORT OF THE WATER COMMISSIONERS.

27

Amount brought forward,	\$558,642 67
Tools,	9,323 74
Labor on pipes,	17,305 79
Cast iron water pipes,	1,911,023 36
Special castings,	91,108 45
Lumber,	1,578 30
Fire hydrants,	93,152 27
Sockanosset hill cross road,	3,855 38
Pettaconset and Sockanosset telegraph line,	1,887 99
Dwelling houses at Pettaconset,	9,631 71
Culverts and bridge on line of force mains,	6,775 33
Culverts at Pettaconset,	8,587 92
Real estate in Warwick,	13,118 04
Water privileges, mill, and other real estate in Pawtuxet,	50,231 96
Pochasset bridge,	5,559 83
Wharf salaries,	7,757 80
Temporary engine house at Pettaconset,	9,718 09
Roads, slopes, etc., at Pettaconset,	11,903 45
Engine house at Pettaconset,	217,745 62
Natural filter basin,	33,594 50
Removing loam,	463 93
Iron screw piles,	8,766 46
Hydrant bolts,	1,635 98
Pipe bolts,	1,622 33
Photographs,	224 25
Hydrant heads,	7,448 00
Taps and stops,	12,885 34
Valve covers,	7,463 20
Service pipe,	27,289 84
Hydrant boxes,	26,197 41
Setting fire hydrants,	9,844 04
Check valves,	1,412 48
Valve boxes,	27,931 67
Air cocks, boxes, covers and setting,	509 05
Night and Sunday watch at engine house,	1,703 93
Pettaconset pumping station, for sundries,	3,335 02
" " " engineer,	4,169 53
" " " coal and wood,	26,231 79
" " " labor on fuel,	1,848 25
" " " firemen,	4,237 03
" " " land,	26,386 77
Setting blow-offs,	299 66
Ascertaining and removing nuisances on Pawtuxet river	479 46
Taunton Brick Co.,	3,000 00
G. B. & W. F. Inman,	10,650 00
Lobdell & Newmans,	91,300 00
A. & W. Sprague Manufacturing Co.,	2,500 00
Paulding, Kemble & Co.,	26,535 00
W. A. Burdick, Agent,	30,659 10
Thomas Phillips & Co.,	1,050 00
Samuel M. Gray,	2,400 00
Heirs of Joseph Harris,	446 81
City of Providence, fountain, Abbott park,	708 74
City of Providence, public market,	12 00
City Treasurer,	132,189 52
City Treasurer, for water payments,	246,215 25
Amount carried forward,	\$3,229,578 05

Amount brought forward,	\$3,220,578 05
Testing pipe iron,	443 50
Iron drain pipes and gate,	224 21
Carting pipes,	33,459 33
Counsel fees,	6,500 00
Inspection of pipes,	9,786 01
Testing bolts and composition castings,	34 25
Laying water pipes,	331,536 13
Laying service pipes,	25,911 24
Laying suction pipe, etc.,	85 00
Drainage pump and engine,	4,962 54
Hydrants for street sprinklers,	2,124 54
Boston hydrants,	17 23
Inspection of pipe laying,	25,147 58
Temporary boarding house at Pettaconset,	1,340 34
Public drinking fountains and troughs,	1,067 31
Water meters,	46,741 68
Water meters set, belonging to the city,	1,258 73
Setting, inspection and repair of meters,	345 99
Inspection of water fixtures,	2,515 38
Warwick test pits,	1,281 93
Miller boilers at Pettaconset,	94 24
Worthington pumping engine,	41,452 38
Hope pumping engine,	62,834 36
Cornish pumping engine,	7,637 40
Keeper's house at Sockanosset reservoir,	1,114 32
Change of grades,	361 85
Post hydrant, Brook street district,	64 96
	<u>\$3,837,863 47</u>

ENGINEERING DEPARTMENT :—

For instruments,	\$3,836 09
Tools,	696 29
Furniture, stoves, gas fixtures, etc.,	2,760 27
Draughting,	3,523 52
Books, stationery, etc.,	3,022 13
Labor,	6,587 07
Horse and wagon account,	1,744 63
Horse keeping, shoeing, etc.,	1,575 96
Horse hire,	3,996 40
Rent of offices,	7,290 61
Fuel and lights,	676 92
Janitor of rooms,	1,391 50
Experimental filter,	91 08
Sundries,	2,837 13
Test wells,	1,579 40
Consultations,	827 08
Office building at Pettaconset,	553 21
" " Sockanosset reservoir,	563 22
Stakes and strips,	779 60
Printing,	527 56
Maps,	86 67
Service pipe experiments,	295 76
Temporary assistance,	7,661 77
Salaries,	125,459 01
	<u>177,254 93</u>
Amount carried forward,	<u>\$4,015,208 45</u>

REPORT OF THE WATER COMMISSIONERS.

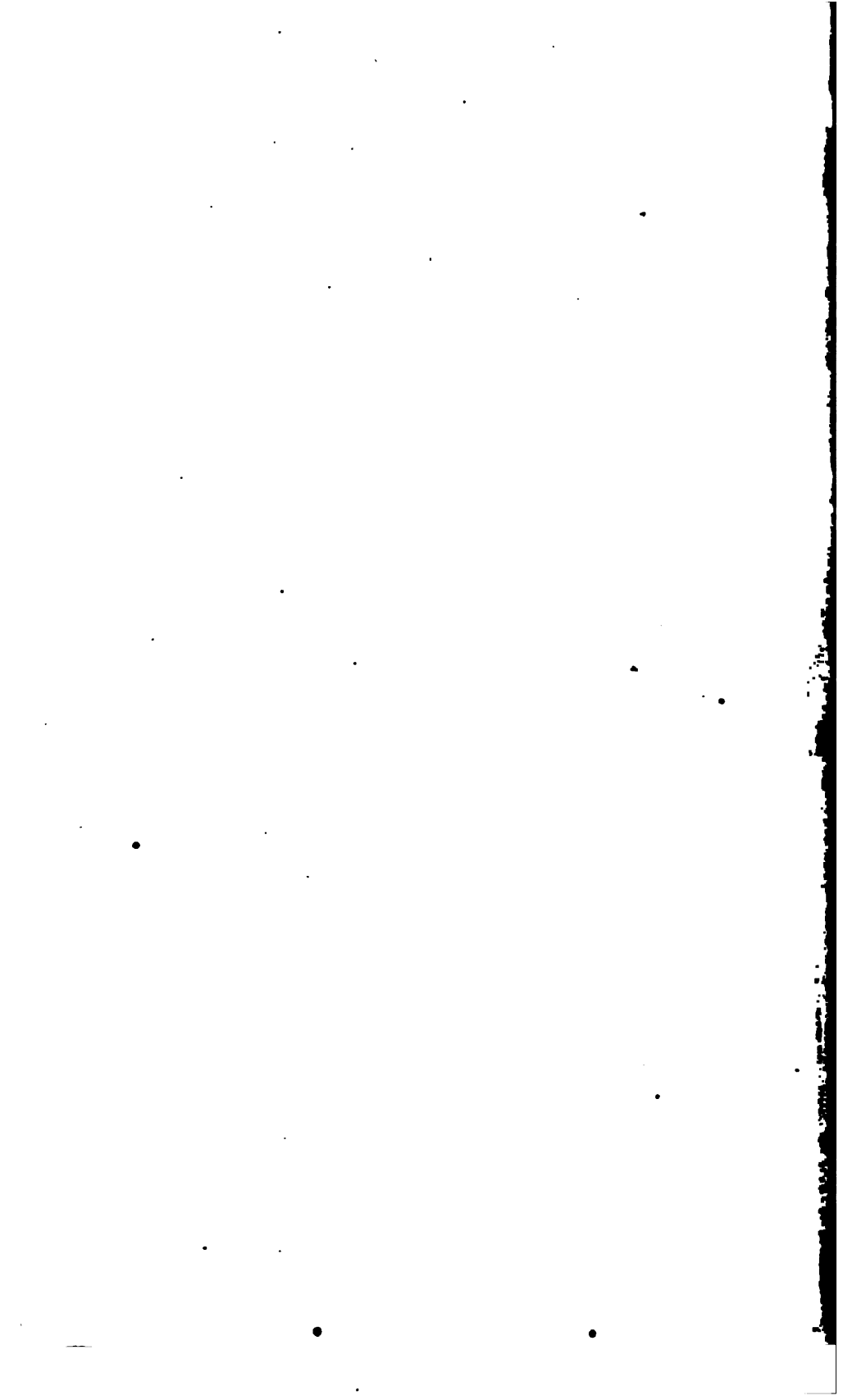
29

Amount brought forward,	\$4,015,308 45
On.	
Hope reservoir, for land, (rents received and buildings, etc., sold),	5,898 15
Sockanosset reservoir, for land, (rents received and wood, etc., sold,)	1,584 49
Real estate in Warwick, (rents received),	1,131 24
Water privileges, mill, and other real estate in Pawtuxet, (rents received),	3,839 53
Pettaconset pumping station, for land, (rents received),	487 39
J. B. & J. M. Cornell,	1,000 00
Warren Foundry and Machine Co.,	4,195 00
Gloucester Iron Works,	7,490 47
Interest,	54 66
Water meters,	47,054 80
Penalties,	186 00
Water,	246,315 25
Approved bills,	3,696,126 47
	<u>\$4,015,308 45</u>

**SCHEDULE OF RECEIPTS FOR WATER, BY MONTHS, FROM
COMMENCEMENT TO SEPTEMBER 1ST., 1874.**

MONTH.	1872.	1873.	1874.
January.....	.....	\$40,699 09	\$39,356 70
February	796 06	4,314 80	3,678 96
March.....	6,671 82	6,669 73	9,221 19
April.....	1,668 59	2,810 07	4,936 98
May.....	2,063 41	1,766 28	2,338 59
June	8,634 89	8,228 92	2,583 35
July.....	3,488 27	6,214 24	13,736 51
August.....	1,818 14	1,441 09	1,953 37
September.....	4,933 44	7,550 64	.....
October..	5,079 08	8,745 53	.....
November.....	477 04	872 83	.....
December.....	5,372 77	8,072 87	.....
	\$41,003 51	\$97,386 09	\$107,825 65





1875.

CITY DOCUMENT.

No. 36.

SIXTH QUARTERLY REPORT
OF THE BOARD OF
WATER COMMISSIONERS
OF THE
CITY OF PROVIDENCE.

[Elected February 27, 1874.]

SEPTEMBER 1, 1875.



PROVIDENCE:
ANGELL, BURLINGAME & CO., PRINTERS TO THE CITY.
1875.

1875.

CITY DOCUMENT.

No. 36.

SIXTH QUARTERLY REPORT
OF THE BOARD OF
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OF THE
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[Elected February 27, 1874.]

SEPTEMBER 1, 1875.



PROVIDENCE:
ANGELL, BURLINGAME & CO., PRINTERS TO THE CITY.
1875.

ORGANIZATION
OF THE
PROVIDENCE WATER WORKS.

BOARD OF WATER COMMISSIONERS.

JOSEPH J. COOKE, PRESIDENT.

CHARLES E. CARPENTER,

WILLIAM CORLISS.

SECRETARY OF THE BOARD OF WATER COMMISSIONERS.

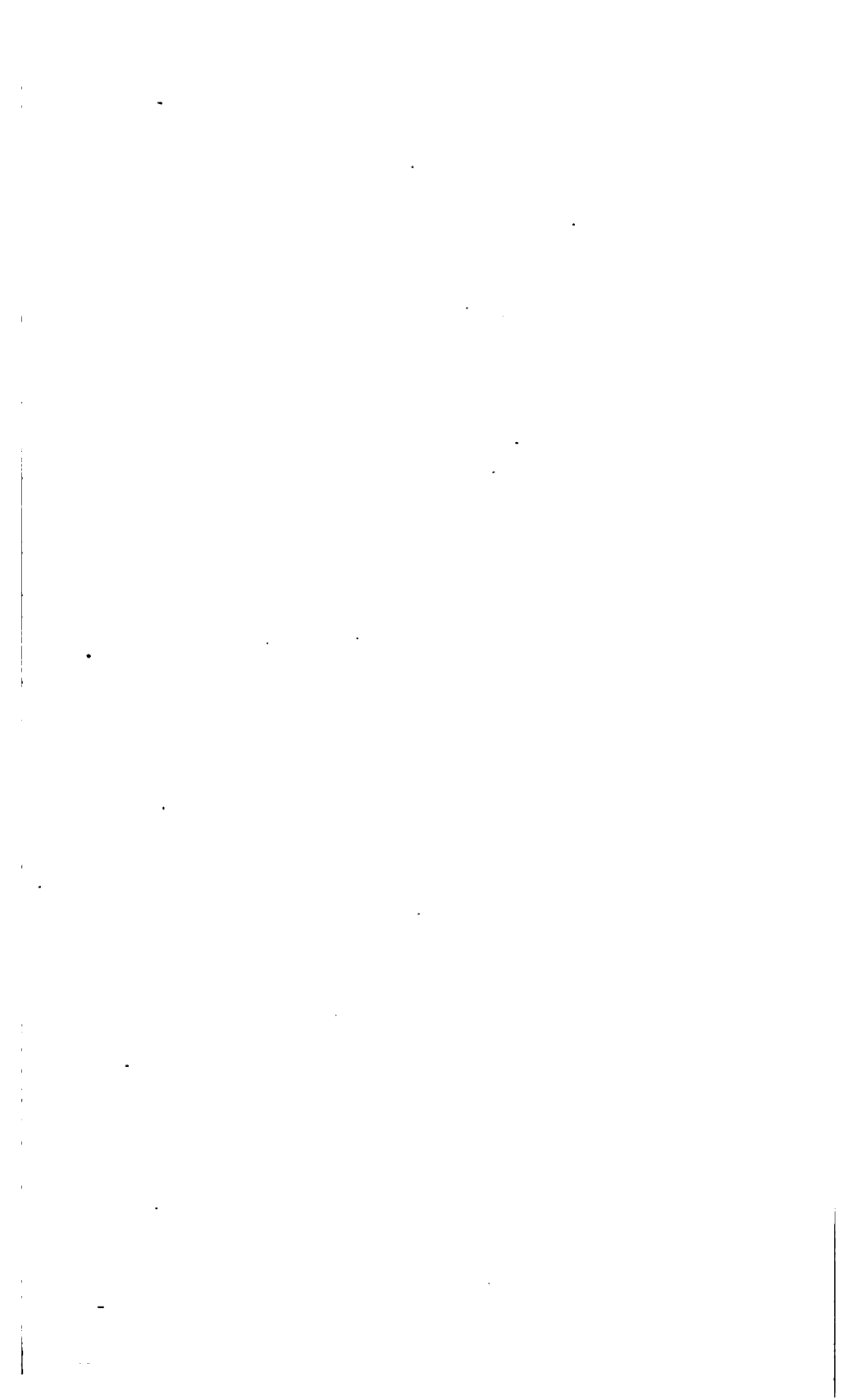
CLINTON D. SELLEW.

Office No. 35 North Main Street.

CHIEF ENGINEER.

J. HERBERT SHEDD.

Office No. 35 North Main Street.



REPORT.

OFFICE OF THE BOARD OF WATER COMMISSIONERS, }
Providence, R. I., September 1, 1875. }

TO THE HONORABLE THE CITY COUNCIL:—

The undersigned Water Commissioners, elected February 27th, 1874, under "An Ordinance to establish a Board of Water Commissioners," approved same day, respectfully present their Sixth Quarterly Report:

Edwin P. Dawley has been appointed Assistant Engineer, with a salary of one thousand dollars per annum, dating from June 25th, 1875. Mr. Dawley had served for three years as a student in the engineering department.

Jesse W. Coleman has entered upon the duties of Commissioners' Clerk, on trial, with a salary of six hundred dollars per annum.

The salary of Howard A. Carson, Assistant Engineer, has been increased to three thousand dollars per annum, dating from June 1, 1875.

The salary of Edward A. Moran, Inspector of Water Meters, has been increased to twelve hundred dollars per annum, dating from July 1, 1875.

The salary of John Cuthbert, Pumping Engineer at Pettaconset, has been increased to twelve hundred and fifty dollars per annum, dating from September 1, 1875.

An offer of Dexter Gorton & Co., to furnish certain materials and perform the carpenters' work, for the Gate House at Hope Reservoir, as per plans, for the sum of one hundred and seventy-five dollars, (\$175.00,) has been accepted.

The house then standing on Hope Reservoir lands, near the engine house, was sold at auction, August 12th, for three hundred and ten dollars, (\$310.00), to be removed.

A certain lot or parcel of land situate in the village of Pawtuxet, in the town of Cranston, being a portion of the property formerly leased to Stafford & Co., has been leased to the Union Railroad Company, at the rate of twenty-five dollars per annum, payable semi-annually; the lease to terminate on three months notice from either party.

Hope Reservoir is completed, and is now filling with water.

Pettaconset Engine House, the Cornish engine, and the second engine for Hope Pumping Station, are all nearly completed.

The annexation of the territory now the Tenth Ward has added largely to the High Service District, more than one half of the area of the ward being of an altitude too great to be efficiently supplied by gravity from Sockanosset and Hope Reservoirs. The area of High Service now supplied with water by the objectionable system of pumping directly into the pipes, only to be justified by peculiar circumstances, is very limited. The nearly four-fold increase of the area of this service renders it highly desirable that a reservoir of sufficient height should, at no distant day, be constructed. Such a reservoir would also be of great advantage, if, as is hoped, an arrangement should be made to supply the town of Pawtucket with water. The Commissioners have consequently purchased a location suitable for a reservoir on Olney's Hill in the town of Lincoln, at an elevation for the water surface of about two hundred and ninety feet above mean high water.

A deed of about $15\frac{1}{2}$ acres has been obtained in consideration of the sum of two thousand and forty-three $\frac{8}{100}$ (2,043.09) dollars, and a deed has been made to the city of six acres adjoining for the sum of nine hundred (900) dollars. The last named deed has just been received, and the consideration has not yet been paid.

The daily consumption of water, including waste and leakage, during the last quarter, was about 2,500,000 gallons.

Plumbers' licenses have been issued as follows:

William G. Heath,	William B. Thompson,
William T. Shanley,	William F. Wright.

The whole number of plumbers' licenses issued is sixty-one. Suspended, one. Revoked, one. Remaining in force, fifty-nine.

The following statement shows the length of pipes laid during the last quarter; the sizes of the pipes; where laid; and the totals since the commencement of the work:

30 INCH.

In Waterman street,	250 feet.
Including 2 reducers.	
Previously,	58,826 feet.
Total,	59,076 feet.

24 INCH.

In Prospect and Waterman streets,	882 feet.
Including 2 cut pipes and four curved pipes.	
Previously,	23,060 feet.
Total,	23,942 feet.

16 INCH.

In Broad Street,	1,636 feet.
Including 4 cut pipes, 14 branches and 1 gate.	
Previously,	21,566 feet.
Total,	23,202 feet.

12 INCH.

In North Main street, Atwell's and Manton avenues,	4,794 feet.
Including 10 cut pipes, 3 curved pipes, 25 branches and 3 gates.	
Previously,	27,237 feet.
Total,	<u>32,031 feet.</u>

10 INCH.

In Gaspee street and Nash lane,	1,255 feet.
Including 6 cut pipes, 1 curved pipe, 10 branches and 1 gate.	
Previously,	8,823 feet.
Total,	<u>10,078 feet.</u>

8 INCH.

In Holden, Hope, Julian and Promenade streets,	1,834 feet.
Including 9 cut pipes, 5 curved pipes, 6 branches and 3 gates.	
Previously,	71,781 feet.
Total,	<u>73,615 feet.</u>

6 INCH.

In Abbott, Amherst, Bernon, Borden, Briggs,
Brownell, Carroll, Candace, Cedar, Common,
Crary, Crimea, Daboll, Dale, Forest, Francis,
Gallup, Hardenburg, Hewett, Hope, How-
land, Ives, Ivy, Langley, Lime, Manning,
Moore, Newton, Olive, Pettis, Piedmont,
Plane, Pleasant, Potter, Printery, Putnam,
Redwing, Republican, Sherburne, Shove,
Steuben, Stokes, Swan, Temple, Updike,
Warren, West Park, Williams and Winsor
streets; in Maiden and Nash lanes, and in

East, Potter's and Reservoir avenues,	21,251 feet.
Including 100 cut pipes, 33 curved pipes, 41 branches and 54 gates.	
Previously,	365,680 feet.
Total,	<u>386,931 feet.</u>
Total of all sizes during the last quarter, or $6.\frac{042}{1000}$ miles.	31,902 feet.
Previously, including 20 and 36 inch, of which none have been laid during the last quarter,	593,573 feet.
Total,	<u>625,475 feet.</u>
or $118.\frac{461}{1000}$ miles.	

Forty-eight fire hydrants have been set during the last quarter, one in each of the following locations :—

Amherst street,	north-west corner of Steuben street.
Atwell's avenue,	north-west corner of Steuben street.
"	" north side, about 250 feet west of Valley street.
Briggs street,	north side, about 170 feet east of Ocean street.
Broad	" south-east corner of Dexter avenue.
"	" east side, in line with north side of Earley street.
"	" east side, in line with south side of street first south of Gallatin street.
"	" south-east corner of Prairie avenue.
"	" north-east corner of Richardson street.
Cabot	" east side, half-way between Angell and Meeting streets.
Calender street,	east side, at north end of Barstow's new building.
Carroll	" east side, about half-way between Orms and Common streets.
Cedar	" north side, opposite east line of Bond street.
Daboll	" south side, about 560 feet east of Greenwich street.
Dale	" north-west corner of Cedar street.

Forest street, north-west corner of Ivy street.

Francis " south-west side, about 135 feet north-west of Gaspee street.

Gaspee " south-east side, about 175 feet south-west of Francis street.

" " south-east side, about 200 feet north-east of Francis street.

Geisler street, south side, about 150 feet west of Asia street.

Hardenburg street, south-east corner of Bailey street.

" " east side, half-way between Chalkstone avenue and Bailey street.

Holden street, north-east corner of Jewett street.

Langley " north side, about 415 feet west of Hospital street.

" " north side, about 180 feet east of Plane street.

Maiden lane, west side, about 500 feet south of Potter's avenue.

Moore street, south side, about 240 feet west of Broad street.

" " south side, about 280 feet east of Greenwich street.

Mountain street, north side, half-way between Newton and Anthony streets.

North Main street, south-east corner of Abbott's lane.

" " " south-east corner of Evergreen street.

" " " north-east corner of Grand View street.

Olive street, south side, about 160 feet east of Brown street.

Pettis " east side, about half-way between Shove and Polk streets.

Piedmont street, north-west corner of Adams street.

Plane " south-west corner of Gallup street.

Pleasant " north-west corner of East avenue.

Potter " south side, 160 feet east of Broad street.

Potter's avenue, south-east corner of Plane street.

Preston street, north side, about 215 feet east of Ives street.

Printery " east side, about half-way between Randall street and Nash lane.

Reservoir avenue, south-west corner of Crescent street.

Sherburne street, north side, half-way between Eddy and Plane streets.

Spruce street, north side, 174 feet west of McAvoy street.

Swan " north-east corner of Plane street.

" " north side, about 350 feet west of Plane street.

Urdike street, south-east corner of Moore street.

Williams street, north side, half-way between Ives and Governor streets.

The total number of fire hydrants is now eight hundred and eighty.

Two hydrants have also been set for use in filling sprinkling carts, etc. The number of such hydrants is now twenty-seven.

The height of water in Sockanosset Reservoir at 7 o'clock this morning was 177.55. High water in the reservoir is 180.50 (above high tide in Providence river).

Two Ball & Fitts' water meters, made by the Union Water Meter Co., and one hundred and forty-four water meters, made by Fales, Jenks & Sons, have been put in at the expense of water takers, since the date of the last report. Two five-eighths inch Ball & Fitts' water meters, seriously injured by frost, have been changed, at the expense of water takers, for meters made by Fales, Jenks & Sons; and one two inch Ball & Fitts' water meter has been replaced by a three inch meter of the same make. The use of one Ball & Fitts' and one Worthington meter has been discontinued, and the parties now pay schedule rates.

There are now twenty-one hundred and fifty-eight water meters in use, viz. :—

KIND.	SIZES.							TOTALS.
	$\frac{1}{8}$ inch.	$\frac{3}{8}$ inch.	1 inch.	$1\frac{1}{2}$ inch.	2 inch.	3 inch.	4 inch.	
Ball & Fitts.	1,242	225	82	45	8	1	1	1,604
Worthington.	169	....	....	....	...	..	1	170
Fales, Jenks & Sons.....	....	368	16	....	....	.	....	384
	1,411	593	98	45	8	1	2	2,158

The total number of applications for a supply of water, is sixty-four hundred and seventy-six.

The number of new service stops opened during the last quarter, is three hundred and ninety-six.

The number of service stops opened to date, is fifty-five hundred and seventeen.

Five stops have been closed during the last quarter, for non-payment of bills, one of which has been re-opened on payment of bill, and a penalty of two dollars. Ten stops previously closed for non-payment, have been re-opened during the last quarter; in nine cases the bills and a penalty of two dollars, were paid, and one for reason of attendant circumstances was re-opened on payment of the bill, without penalty. Thirty-two stops, closed for non-payment, remain unopened.

Water is now supplied for the following uses:

3 armories; 8 bakeries; 36 banks; 85 bar-rooms; 2 bath houses; 1 bath house—Turkish; 115 boarding houses; 8 bottling establishments; 40 building purposes; 1 burying ground; 1 car house; 3 carriage depositories; 3 chasers; 1 Christian Union; 27 churches; 1 city barn; 2 city bridges; 1 city building; 13 city drinking fountains; 23 city drinking troughs; 880 city fire hydrants; 9 city fire steamer stations;

3 city hose houses; 8 club rooms; 14 coal yards; 1 college; 1 colored shelter; 1 conservatory of music; 3 convents; 1 court house; 1 decorator; 1 Dexter Asylum; 2285 dwellings of one family; 2155 dwellings of two families; 202 dwellings of three families; 243 dwellings of four families; 29 dwellings of five families; 45 dwellings of six families; 4 dwellings of seven families; 6 dwellings of eight families; 1 dwelling of nine families; 1 dwelling of twelve families; 2 dye houses; 5 elevators; 1 engine turner; 4 engravers; 1 express carriage house; 53 fire supplies—private; 57 fountains—private; 1 fountain—public; 1 furrier; 2933 garden and street hydrants; 4 gas holders; 6 gold and silver platers; 6 gold and silver refiners; 2 grain elevators; 35 green houses; 19 halls; 1 Home for Aged Women; 2 hospitals; 16 hotels; 1 infirmary; 4 laundries; 1 library; 1 lithographer; 18 lodging houses; 2 lumber dealers. *Manufacturing establishments*,—2 belt and picker; 3 blank book; 2 bleacheries; 1 bologna sausage; 1 bonnet bleachery; 1 boot and shoe; 1 box; 1 braiding works; 2 brass foundries; 2 breweries; 1 brush; 2 butt; 1 butter; 9 carriages; 2 cement pipe; 1 chain; 6 cigar; 1 cigar box; 18 cloak and dress; 1 coffin; 8 confectionery; 1 corset; 3 colorers of jewelry; 8 cotton; 1 crocus; 3 die sinkers; 2 dye wood; 1 emery wheel; 1 enameler of jewelry; 1 eyelet; 3 file; 8 furniture; 1 gas; 1 gas burner; 4 gas fixtures; 1 geer; 3 hat; 4 harness; 1 horse shoe; 2 ice cream and soda water; 1 iron company; 1 iron fence; 10 iron foundries; 1 Japan switch; 1 jewelers' cards; 90 jewelry; 4 lapidaries; 26 machinists; 1 mowing machine; 1 nail keg; 2 oil; 1 organ; 1 paper box; 1 paper collar; 3 paper cop tube; 1 pattern; 3 patent medicine; 1 pencil case; 3 picture frame; 1 paint works; 2 pumps; 2 reed; 1 rubber goods; 1 rubber tubing; 4 sash and blind; 2 screw; 1 sheet iron; 2 shirt; 3 silverware; 6 soap; 1 spiral spring; 1 starch; 1 steam boiler; 2 steam engine; 1 stencil plate; 1 stove; 2 tanners; 2 thread; 1 tin ware; 4 tool; 3 top roll; 6 woolen goods; 1 yeast. *Markets*,—44 fish; 107 meat. *Mills*,—2 drug and grain; 3 flour and grain;

1 paint; 9 planing. 5 marbleworks; 1 nickel plater; 1 opera house; 2 orphan asylums; 5 organs; 5 oyster houses; 549 offices; 11 photographers; 10 printing establishments; 7 plaster and stucco workers; 10 plumbers; 9 provision curers and packers; 6 police stations; 7 railroads; 1 reading room; 42 restaurants; 1 roofer. *Saloons*,—4 billiard; 3 bowling; 6 ice cream; 21 lager beer; 10 oyster. *Schools*,—1 boarding; 12 private; 36 public; 1 reform. *Shops*,—41 barber; 10 blacksmith; 1 carpenter; 3 cooper; 1 gunsmith; 1 junk; 15 paint; 5 shoemaker; 22 tailor; 5 tinman. *Stables*,—6 hack; 45 livery; 278 private; 4 sale; 69 work. 13 steamboats; 13 steamships; 5 steam and gas pipe fitters. *Stores*,—1 agricultural implement; 44 apothecary; 1 auction; 4 book; 30 boot and shoe; 2 carpet; 2 carriage trimmings; 11 cigars; 24 clothing; 9 confectionery; 3 drug; 38 dry goods; 80 fancy goods; 1 florist; 10 flour and grain; 12 fruit; 1 fish; 12 furniture; 12 gent's furnishing goods; 142 grocery, retail; 15 grocery, wholesale; 10 hardware; 2 hide and leather; 2 hoop skirt; 11 house furnishing goods; 4 house paper; 3 iron and steel; 11 jewelry; 13 liquor; 1 lime and brick; 2 manufacturers' supplies; 29 millinery; 9 newspaper; 4 oil and paint; 2 paper and paper stock; 1 piano forte; 7 produce, wholesale; 3 sewing machine; 4 stationery; 2 stove; 4 tea; 2 trunk; 1 toy; 1 umbrella; 2 wooden ware; 1 wool; 2 woolen goods. 1 State prison; 1 store house; 1 theatre; 4 undertakers; 1 United States custom house building; 2 upholsterers; 2 water boats; 1 wheelwright; 1 wood turner; 4 wood yards; 28 not classed.

The amount of expenditures, during the last quarter, is	-	-	-	-	\$154,701 41
The total amount of expenditures, is	-				4,484,779 84
The total amount of appropriations, is					4,700,000 00
The unexpended balance, is	-			-	215,220 16

The cost of construction to date, (deducting from the whole amount of approved bills the cost of maintenance, the amounts received for

labor and materials, &c. ; meters ; from sewer department for office expenses ; estimated amount due from sewer department for engineering, &c. ; and adding amount of reservations due to contractors), is

4,104,033 33

The cost of maintenance to date, is 133,845 26

The amount received during the last quarter, all of which has been paid to the City Treasurer, is

For water supplies, - \$21,177 88

" water meters, - - 3,799 00

" penalties, - - 22 00

" sundries, - - 6,029 43

31,028 31

The amount received for water in 1872, was 41,003 51

The amount received for water in 1873, was 97,386 09

The amount received for water in 1874, was 132,052 39

The amount received for water during the first eight months of 1875, was - - 135,399 83

The total amount received for water to date, is 405,841 82

The amount of all receipts to date, is - 629,542 18

A schedule of bills approved during the last quarter, and of receipts during the same time, a trial balance of ledger, August 31, 1875, and a schedule of receipts for water by months, are hereunto appended and made parts of this report.

A separate report of that portion of the duties of the Board which relates to sewers will be presented.

JOSEPH J. COOKE,
CHAS. E. CARPENTER, } *Board of Water Commissioners.*
WILLIAM CORLISS,

**SCHEDULE OF BILLS APPROVED BY THE BOARD OF WATER
COMMISSIONERS, FROM JUNE 1, 1875, TO AUGUST 31, 1875,
INCLUSIVE.**

1809	Schooner John Brooks, freight of water pipes (charged to Warren Foundry and Machine Co.),	-	\$131 82
1810	Samuel M. Gray, on account for payments for labor at Pettaconset,	-	500 00
1811	Samuel M. Gray, paid by him for labor at Pettaconset, &c.,	-	2,544 81
1812	" " on account for payments for labor at Pettaconset,	-	500 00
1813	Providence Steam Engine Co., on account for constructing pumping engine,	-	11,000 00
1814	Lobdell & Newmans, on account for constructing Hope Reservoir,	-	9,175 00
1815	Foster S. Dennis, trenching and back-filling, and laying water pipes,	-	1,800 00
1816	Foster S. Dennis, carting pipes,	-	290 98
1817	Warren Foundry and Machine Co., cast iron water pipes,	-	2,266 11
1818	Paulding, Kemble & Co., on account for constructing pumping engine,	-	1,500 00
1819	G. B. & W. F. Inman, balance of reservation for laying water pipes in 1874,	-	2,944 93
1820	Fuller Iron Works, special castings, valve boxes and covers,	-	2,404 12
1821	William H. Miller & Co., blacksmith's work, repairing tools &c.,	-	81 46
1822	Fales, Jenks & Sons, water meters,	-	1,436 23
1823	Wood & Winsor, pipe, couplings, elbows, labor, &c.,	-	93 11
1824	Thomas Phillips & Co., service pipe,	-	375 09
1825	Samuel M. Gray, on account for payments for labor at Pettaconset,	-	300 00
1826	Charles H. Pierce, salary as assistant engineer,	-	250 00
1827	Otis F. Clapp, " " " "	-	208 33
1828	Howard A. Carson, " " " "	-	250 00
1829	William T. Schneider, " " " "	-	100 00
1830	John E. Bowen, " " " "	-	100 00
1831	Daniel D. Waterman, " " " "	-	83 33
1832	Lepilete Sweet, 2d., " " " "	-	83 33
1833	Edmund B. Weston, " " " "	-	83 33
1834	William M. Brown, Jr., " " " "	-	83 33
1835	Daniel C. Stone, " " " "	-	83 33
1836	Edwin P. Dawley, " " " "	-	16 67
1837	William F. Janes, " " service pipe engineer,	-	83 33
1838	Augustus F. Nagle, " " mechanical engineer,	-	100 00
Amount carried forward,			\$38,868 64

REPORT OF THE WATER COMMISSIONERS.

17

	Amount brought forward,	-	-	\$38,868 64
1839	Edwin P. Dawley,	salary as student, engineering department,	33 33	
1840	Frank B. Ferris,	" " " "	41 67	
1841	Thomas L. Eotts,	" " " "	41 67	
1842	William H. Ounstead,	" " " "	41 67	
1843	George B. Francis,	" " " "	33 33	
1844	Charles A. Harper,	" " " "	28 33	
1845	Alfred E. Martin,	" " " "	33 33	
1846	Charles F. Angell,	" " " "	25 00	
1847	Albert L. Bodwell,	" " " "	33 33	
1848	Walter F. Slade,	" " service pipe clerk, "	83 33	
1849	William Aplin,	" " clerk, engineering department,	83 33	
1850	William H. Turner,	" " " "	100 00	
1851	Irving H. Potter,	" " " "	58 50	
1852	Andrew B. Purdy,	" " superintendent of pipe work,	106 67	
1853	William H. Patterson,	" " inspector on pipe line,	104 00	
1854	Samuel R. Eccleston,	" " " "	104 00	
1855	S. Horace Wheeler,	" " " of service pipes,	125 00	
1856	Henry M. Wilcox,	" " assistant inspector of service pipes,	100 00	
1857	Frederic A. Arnold,	" " inspector of water fixtures,	100 00	
1858	Albert C. Winsor,	" " asst. " " "	78 00	
1859	Edward A. Moran,	" " " " meters,	83 33	
1860	John Lyons,	" " plumber, meter department,	65 00	
1861	John Higgins,	" " " "	21 00	
1862	John Lally,	" " plumber's helper, meter department,	22 50	
1863	Simeon Noell,	salary as inspector of engine work, -	230 06	
1864	Burrows Chace,	" " " at Hope Reservoir,	130 00	
1865	George W. Mitchell,	" " " " "	115 00	
1866	Alexis C. Miller,	" " " " "	105 00	
1867	Jeptha Baker,	" " keeper of Sockanosset Reservoir,	75 00	
1868	Albert E. Angell,	" " temporary ass't engineer'g departm't,	45 50	
1869	George H. Slade,	" " " " "	54 00	
1870	Edward C. Reynolds,	" " " " "	39 00	
1871	George W. Winsor, Jr.,	" " " " "	36 00	
1872	Henry G. Dennis,	" " superintendent of pipe yard,	125 00	
1873	Richard M. Wood,	" " clerk at pipe yard,	83 33	
1874	John Cuthbert,	" " pumping engineer, Pettaconset,	100 00	
1875	John Hamilton,	" " " " "	85 00	
1876	George F. Barney,	" " fireman, Pettaconset,	60 00	
1877	Patrick O'Rourke,	" " " " "	70 00	
1878	John Quinn,	" " pumping engineer, Hope station,	125 00	
1879	Joseph F. Plant,	" " " " "	90 00	
1880	Thomas Miller,	" " fireman, Hope station,	65 00	
1881	Michael Hamill,	" " " " "	65 00	
1882	William F. Tanner,	" " axeman,	48 00	
1883	William H. Kelly,	testing cement,	- 44 44	
1884	Warren S. Burnap,	" " "	- 43 20	
1885	Henry Wright,	" " "	- 14 00	
	Amount carried forward,	-	-	\$42,342 43

	Amount brought forward,	-	-	\$42,342 43
1886	Jesse W. Coleman, salary as commissioners' clerk,	-	-	35 00
1887	Leonard N. Austin, Jr., " " " "	-	-	75 00
1888	Thomas C. Gushee, " " " "	-	-	100 00
1889	Philip S. Chase, " " " "	-	-	150 00
1890	Clinton D. Sellew, salary as secretary of water commissioners,	-	-	200 00
1891	John Purnell, " " janitor, &c.,	-	-	56 98
1892	Clinton D. Sellew, paid by him for sundries,	-	-	41 13
1893	Charles H. Pierce, " " labor,	-	-	1,781 66
1894	" " " " sundries,	-	-	57 01
1895	Samuel M. Gray, engineering services, self and assistants,	-	-	372 34
1896	" " " paid by him for labor,	-	-	506 48
1897	" " " horse hire, and sundries,	-	-	64 88
1898	Providence Press Co., advertising,	-	-	21 85
1899	Knowles, Anthony & Danielson, advertising,	-	-	18 37
1900	J. C. Thompson, mounting folded maps,	-	-	18 75
1901	Potter, Denison & Co., office furniture,	-	-	14 25
1902	Gorham Mfg. Company, badges,	-	-	10 00
1903	J. M. Baker, rods with brass ends,	-	-	6 46
1904	A. Waite, teaming,	-	-	8 15
1905	Isaac Hale, repairing tide gauge clock,	-	-	22 00
1906	Newport Mfg. Company, couplings,	-	-	19 69
1907	Waldron, Wightman & Co., soap,	-	-	6 80
1908	W. E. Barrett & Co., lawn seed,	-	-	8 00
1909	F. P. Little, valvoline oil and felting,	-	-	70 95
1910	Seth Clark, cutting and dressing stone,	-	-	81 00
1911	Walter Coleman & Sons, sheaves, &c., (charged to Paulding, Kemble & Co.),	-	-	14 62
1912	John A. Moore, teaming, &c.,	-	-	44 50
1913	Daniel F. Burlingame, repairing tools, &c.,	-	-	36 10
1914	Wood & Winsor, machinist's labor, pipe and fittings, &c.,	-	-	42 44
1915	Union Water Meter Co., repairing meters, &c.,	-	-	119 00
1916	John H. Eddy, brooms, baskets, &c.,	-	-	16 75
1917	Providence Builders' Association, bricks,	-	-	107 50
1918	Abbott Lawrence, expressage on meters,	-	-	19 50
1919	Providence and Stonington Steamship Co., freight of iron work, (charged to Architectural Iron Works),	-	-	15 00
1920	J. A. Gowley & Son, steel tape,	-	-	42 25
1921	Providence Steam Engine Co., repairing hydraulic pump,	-	-	19 05
1922	Hopkins & Pomroy, coal, lime, cement, teaming, &c.,	-	-	4,147 93
1923	Paulding, Kemble & Co., on account for constructing pumping engine,	-	-	300 00
1924	do. do. do. do. do.	-	-	1,400 00
1925	Samuel M. Gray, on account for payments for labor,	-	-	500 00
1926	" " " paid by him for labor at Pettaconset,	-	-	1,480 43
1927	Barker, Whitaker & Co., tools, hose, rope, &c.,	-	-	392 44
1928	Lobdell & Newmans, on account for constructing Hope Reservoir,	-	-	16,150 00
1929	Foster S. Dennis, trenching and back-filling, and laying water pipes,	-	-	3,150 00
	Amount carried forward,	.	.	\$74,085 69

	Amount brought forward,			\$74,085 69
1930	Tucker, Swan & Co., coal,	-	-	375 92
1931	William H. Miller & Co., blacksmith's work, repairing tools, &c.,	-	-	29 79
1932	John H. Appleton, collecting and testing samples of water,	-	-	30 00
1933	H. B. Bowen, pipe bolts,	-	-	53 18
1934	Akerman & Co., blank books,	-	-	56 80
1935	Providence Concrete Co., concreting around service boxes,	-	-	72 50
1936	Tuttle & Hobbs, horse keeping, &c.,	-	-	287 93
1937	Providence Gas Co., gas,	-	-	104 52
1938	Foster S. Dennis, carting pipes,	-	-	575 72
1939	Fales, Jenks & Sons, meters,	-	-	1,540 03
1940	Fuller Iron Works, valve boxes, special castings, &c.,	-	-	2,222 24
1941	Thomas Phillips & Co., service pipe,	-	-	1,582 82
1942	Dexter Gorton & Co., carpenter's work, lumber, &c.,	-	-	340 75
1943	Lobdell & Newmans, labor, &c., at Hope station,	-	-	584 36
1944	Edward T. Caswell, M. D., professional services, Thomas Garrity, (charged to Paulding, Kemble & Co.),	-	-	40 00
1945	L. B. Inman, charges in consequence of injury to Thomas Garrity, (charged to Paulding, Kemble & Co.),	-	-	55 93
1946	Bridget Coffey, charges in consequence of injury to Thos. Garrity, (charged to Paulding, Kemble & Co.),	-	-	33 17
1947	Thomas Phillips & Co., on account for labor and materials, engine house at Pettaconset,	-	-	1,500 00
1948	Warren Foundry and Machine Co., cast iron water pipes,	-	-	9,276 37
1949	Fales, Jenks & Sons, on account for fire hydrants, hydrant boxes, &c.,	-	-	7,500 00
1950	Lawton & Stockman, professional services, Thomas Garrity, (charged to Paulding, Kemble & Co.),	-	-	90 00
1951	Hopkins & Pomroy, teaming,	-	-	84 00
1953	Henry L. Norris, thawing service pipes,	-	-	25 75
1953	New England Butt Co., drinking trough castings,	-	-	12 12
1954	Samuel M. Gray, on account for payments for labor,	-	-	800 00
1955	James Glass, labor, &c., engine house at Pettaconset,	-	-	960 77
1956	Robert Arnold, damage by surface water from Hope Reservoir grounds,	-	-	75 00
1957	William H. Fenner & Co., oil cans, labor, &c.,	-	-	27 74
1958	City of Providence, sewer department, labor and materials on account of thawing pipes,	-	-	81 91
1959	S. L. Watson, carting brick,	-	-	16 50
1960	Gorham Mfg. Company, cups and chains for drinking fountains,	-	-	45 00
1961	L. H. Tillinghast & Co., faucets, &c., " " "	-	-	54 50
1962	Barker, Whitaker & Co., tools, &c.,	-	-	32 99
1963	Wood & Winsor, labor, pipe and fittings, &c.,	-	-	113 94
1964	Dexter Gorton & Co., carpenter's work, lumber, &c.,	-	-	301 48
1965	Fales, Jenks & Sons, fire hydrants, stop valves, hydrant boxes, &c.,	-	-	3,123 89
1966	Thomas Phillips & Co., pipe, labor, couplings, elbows, &c.,	-	-	119 51
1967	Charles H. Pierce, salary as assistant engineer,	-	-	250 00
1968	Otis F. Clapp, " " " " "	-	-	208 33
1969	Howard A. Carson, " " " " "	-	-	250 00
	Amount carried forward,			\$107,021 15

	Amount brought forward,		\$107,021 15
1970	Wm. T. Schneider, salary as assistant engineer,	-	100 00
1971	John E. Bowen, " " " "	-	100 00
1972	Daniel D. Waterman, " " " "	-	83 33
1973	Lepriete Sweet, 2d., " " " "	-	83 33
1974	Edmund B. Weston, " " " "	-	83 33
1975	Wm. M. Brown, Jr., " " " "	-	83 33
1976	Daniel C. Stone, " " " "	-	83 33
1977	Edwin P. Dawley, " " " "	-	83 33
1978	William F. Janes, " " service pipe engineer,	-	83 33
1979	Augustus F. Nagle, " " mechanical " "	-	150 00
1980	Frank B. Ferris, " " student, engineering department,	41 67	
1981	Thomas L. Botts, " " " " " "	41 67	
1982	William H. Olmstead, " " " " " "	41 67	
1983	George B. Francis, " " " " " "	33 33	
1984	Charles A. Harper, " " " " " "	33 33	
1985	Alfred E. Martin, " " " " " "	6 45	
1986	Charles F. Angell, " " "on trial," " "	25 00	
1987	Albert L. Bodwell, " " " " " "	33 33	
1988	Walter F. Slade, " " service pipe clerk, " "	83 33	
1989	William Aplin, " " clerk, engineering department,	83 33	
1990	William H. Turner, " " " " " "	100 00	
1991	Irving H. Potter, " " " " " "	56 25	
1992	Andrew B. Purdy, " " superintendent of pipe work,	166 67	
1993	William H. Patterson, " " inspector on pipe line,	104 00	
1994	Samuel R. Eccleston, " " " " " "	104 00	
1995	S. Horace Wheeler, " " " of service pipes,	125 00	
1996	Henry M. Wilcox, " " assistant inspector of service pipes,	100 00	
1997	Frederic A. Arnold, " " inspector of water fixtures,	100 00	
1998	Albert C. Winsor, " " assistant inspector of water fixtures,	78 00	
1999	Edward A. Moran, salary as inspector of water meters,	-	140 00
2000	John Lyons, " " plumber, meter department,	-	57 50
2001	John Lally, " " plumber's helper, meter department,	-	20 00
2002	Simeon Noell, " " inspector of engine work,	-	250 00
2003	Burrows Chace, " " inspector at Hope Reservoir,	-	130 00
2004	George W. Mitchell, " " " " " "	-	115 00
2005	Alexis C. Miller, " " " " " "	-	105 00
2006	Jephtha Baker, " " keeper of Sockanosset Reservoir,	-	77 50
2007	Albert E. Angell, " " temporary assistant, engineering department,	-	43 75
2008	George H. Slade, salary as temporary assistant, engineering department,	-	82 00
2009	Edward C. Reynolds, salary as temporary assistant, engineering department,	-	37 50
2010	George W. Winsor, Jr., salary as temporary assistant, engineering department,	-	35 25
2011	Mark Willmarth, salary as temporary assistant, engineering department,	-	53 76
	Amount carried forward,	-	\$110,418 75

REPORT OF THE WATER COMMISSIONERS.

21

	Amount brought forward,	-	-	-	\$110,418 75
2012	Warren S. Burnap, salary as temporary assistant, engineering department,	-	-	-	25 50
2013	Charles H. Wheeler, salary as temporary assistant, engineering department,	-	-	-	15 00
2014	C. Frank Parkhurst, salary as temporary assistant, engineering department,	-	-	-	14 00
2015	Henry G. Dennis, salary as superintendent of pipe yard,	-	-	-	125 00
2016	Richard M. Wood, " " clerk at pipe yard,	-	-	-	83 33
2017	John Cuthbert, " " pumping engineer, Pettacconset,	-	-	-	100 00
2018	John Hamilton, " " " " " "	-	-	-	85 00
2019	George F. Barney, " " fireman, Pettacconset,	-	-	-	60 00
2020	Patrick O'Rourke, " " " " " "	-	-	-	70 00
2021	John Quinn, " " pumping engineer, Hope station,	-	-	-	125 00
2022	Joseph F. Plant, " " " " " "	-	-	-	90 00
2023	Thomas Miller, " " fireman, Hope station,	-	-	-	65 00
2024	Michael Hamill, " " " " " "	-	-	-	65 00
2025	William F. Tanner, " " axeman, " " " "	-	-	-	38 00
2026	Jesse W. Coleman, " " commissioners' clerk,	-	-	-	50 00
2027	Leonard N. Austin, Jr., salary as commissioners' clerk,	-	-	-	75 00
2028	Thomas C. Gushee, " " " " " "	-	-	-	100 00
2029	Philip S. Chase, " " " " " "	-	-	-	150 00
2030	Clinton D. Sellew, " " sec'y of water commissioners,	-	-	-	200 00
2031	John Purnell, " " janitor, &c.,	-	-	-	55 84
2032	Charles H. Pierce, paid by him for labor, &c.,	-	-	-	1,500 15
2033	" " " " " " sundries,	-	-	-	102 18
2034	Samuel M. Gray, engineering services, self and assistants,	-	-	-	503 13
2035	" " " " " " horse hire and sundries,	-	-	-	140 24
2036	" " " " " " paid by him for labor,	-	-	-	1,205 96
2037	Charles E. Jencks, labor, &c., at Hope station,	-	-	-	120 69
2038	George L. Brownell, open wagon,	-	-	-	150 00
2039	G. W. Edmunds, repairing and painting wagon,	-	-	-	40 32
2040	J. B. Handy, repairing wagon,	-	-	-	8 12
2041	American Screw Co., screws, (charged to Architectural Iron Works),	-	-	-	43 55
2042	Buff & Berger, repairing and adjusting transit,	-	-	-	36 80
2043	Abbott Lawrence, expressage on meters,	-	-	-	13 80
2044	Johnson & Whittemore, repairs on telegraph line,	-	-	-	7 20
2045	Newport & Providence Lead Works, lead,	-	-	-	69 38
2046	Olney Brothers, oil,	-	-	-	10 50
2047	Allen Fire Department Supply Co., hose, &c.,	-	-	-	18 25
2048	Hammond, Angell & Co., printing,	-	-	-	92 22
2049	Gideon G. Hicks, old boiler, &c., for drinking fountain,	-	-	-	106 33
2050	Freeborn & Crowell, paint, oil, labor, &c.,	-	-	-	24 74
2051	Daniel F. Burlingame, repairing tools, &c.,	-	-	-	25 22
2052	Hopkins & Pomroy, coal, cement and lime,	-	-	-	569 92
2053	Dexter Gorton & Co., carpenter's work, lumber, &c.,	-	-	-	49 87
2054	Cleveland & Brothers, office furniture, &c.,	-	-	-	52 44
2055	C. S. Sweetland, repairing damage to side walk,	-	-	-	17 59
2056	Providence Press Co., advertising,	-	-	-	15 50
	Amount carried forward,	.	.	.	\$116,934 52

	Amount brought forward,	\$116,934 52
2057	Fales, Jenks & Sons, water meters,	1,176 00
2058	Thomas J. Hill, rent of wharf and pipe yard,	875 00
2059	Paulding, Kemble & Co., on account, for constructing pumping engine,	1,300 00
2060	Lobdell & Newmans, on account, for constructing Hope Reservoir,	4,050 00
2061	Lobdell & Newmans, extra labor, &c., Hope pumping station,	250 40
2062	Foster S. Dennis, trenching, and back-filling and laying water pipes,	3,550 00
2063	Foster S. Dennis, carting pipes,	355 85
2064	Hopkins & Pomroy, teaming,	78 00
2065	William H. Knight, charcoal,	36 27
2066	Tucker, Swan & Co., coal,	1,407 28
2067	S. A. Thoruton, shelves for safe, &c., engineering department,	9 12
2068	Thomas Phillips & Co., lead pipe and tin lined lead pipe,	1,351 42
2069	Fuller Iron Works, special castings and valve boxes,	1,563 53
2070	Charles P. Chapman, stone steps at Hope Reservoir,	535 86
2071	Wood & Winsor, labor, pipe and fittings, &c.,	65 93
2072	Charles H. Pierce, on account, for paying laborers,	200 00
2073	Buff & Berger, repairing level, &c.,	24 00
2074	John Mason, altering pattern of drinking fountain, &c.,	7 04
2075	Samuel M. Gray, paid by him for labor at Pettaconset, &c.,	1,267 73
2076	Samuel M. Gray, on account, for payments for labor at Pettaconset,	500 00
2077	B. F. Almy, cop waste,	12 00
2078	T. & W. Breck, rent of offices, &c.,	877 50
2079	James Glass, on account for labor and materials, roof of engine house at Pettaconset,	2,000 00
2080	Stephen Knobb, drawing check valve to Pettaconset,	20 00
2081	William H. Miller & Co., blacksmith's work, repairing tools, &c.,	41 30
2082	Providence and Stonington Steamship Co., freight of iron work, (charged to Architectural Iron Works,)	11 29
2083	Providence Steam and Gas Pipe Co., couplings, elbows, nipples, &c.,	24 47
2084	W. Congdon & Sons, rope, bolts and tape,	7 17
2085	George H. Burnham, services and expenses, selling house near Hope Reservoir,	12 50
2086	Bugbee & Hall, stationery, &c.,	115 99
2087	Architectural Iron Works, on account for roof of engine house and boiler house at Pettaconset,	2,200 00
2088	W. F. & F. C. Sayles, land in Lincoln,	2,043 09
2089	J. Herbert Shedd, salary as chief engineer,	2,000 00
2090	Charles H. Pierce, " " assistant engineer,	250 00
2091	Otis F. Clapp, " " " "	208 33
2092	Howard A. Carson, " " " "	250 00
2093	William T. Schneider, " " " "	100 00
2094	John E. Bowen, " " " "	100 00
2095	Daniel D. Waterman, " " " "	83 33
2096	Lepillete Sweet, 2d, " " " "	83 33

Amount carried forward, - - \$145,978 25

REPORT OF THE WATER COMMISSIONERS.

23

	Amount brought forward,		\$145,978 25
2097	Edmund B. Weston, salary as assistant engineer,	-	83 33
2098	William M. Brown, Jr., " " " "	-	83 33
2099	Daniel C. Stone, " " " "	-	83 33
2100	Edwin P. Dawley, " " " "	-	83 33
2101	William F. Jones, " " service pipe "	-	83 33
2102	Augustus F. Nagle, " " mechanical "	-	150 00
2103	Frank B. Ferris, salary as student, engineering department,	41	67
2104	Thomas L. Botts, " " " "	"	41 67
2105	William H. Olmstead, " " " "	"	41 67
2106	George B. Francis, " " " "	"	33 33
2107	Charles A. Harper, " " " "	"	33 33
2108	Alfred E. Martin, " " " "	"	24 73
2109	Charles F. Angell, " " " on trial, "	"	25 00
2110	Albert L. Bodwell, " " " "	"	83 33
2111	Walter F. Slade, " " service pipe clerk, "	"	83 33
2112	William Alpin, " " clerk, engineering department,	83	33
2113	William H. Turner, " " " "	100	00
2114	Irvin H. Potter, " " " "	60	75
2115	Andrew B. Purdy, " " superintendent of pipe work,	166	67
2116	William H. Patterson, " " inspector on pipe line, -	104	00
2117	Samuel R. Eccleston, " " " " " "	36	00
2118	S. Horace Wheeler, " " " of service pipes, -	125	00
2119	Henry M. Wilcox, " " asst. " " " "	100	00
2120	Frederic A. Arnold, " " " " water fixtures,	100	00
2121	Albert O. Winsor, " " asst. " " " "	78	00
2122	Edward A. Moran, " " " " meters,	100	00
2123	John Lyons, salary as plumber, meter department,	40	00
2124	John Higgins, " " " " "	16	50
2125	James Higgins, " " " " "	50	00
2126	John Lally, " " plumber's helper, meter department,	20	83
2127	Simeon Noell, " " inspector of engine work, .	220	00
2128	Alexis C. Miller, " " " at Hope Reservoir, &c.,	80	81
2129	Jeptha Baker, " " keeper of Sockanosset Reservoir,	77	50
2130	Albert E. Angell, salary as temporary assistant, engineering department,	40	25
2131	George H. Slade, salary as temporary assistant, engineering department,	83	60
2132	Edward C. Reynolds, salary as temporary assistant, engineering department,	39	00
2133	George W. Winsor, Jr., salary as temporary assistant, engineering department,	37	50
2134	Mark Wilmarth, salary as temporary assistant, engineering department,	43	01
2135	Warren S. Burnap, salary as temporary assistant, engineering department,	6	75
2136	Charles H. Wheeler, salary as temporary assistant, engineering department,	17	00
2137	C. Frank Parkhurst, salary as temporary assistant, engineering department,	16	00
	Amount carried forward,		\$148,775 46

	Amount brought forward,	\$148,775 46
2138	Henry G. Dennis, salary as superintendent of pipe yard,	125 00
2139	Richard M. Wood, " " clerk at pipe yard,	83 33
2140	John Cuthbert, " " pumping engineer, Pettaconset,	100 00
2141	John Hamilton, " " " " "	85 00
2142	George F. Barney, " " fireman, Pettaconset,	60 00
2143	Patrick O'Rouke, " " " " "	70 00
2144	John Quinn, " " pumping engineer, Hope station,	125 00
2145	Joseph F. Plant, " " " " "	90 00
2146	Thomas Miller, " " fireman, Hope station,	65 00
2147	Michael Hamill, " " " " "	65 00
2148	William F. Tanner, " " axeman,	54 00
2149	Jesse W. Coleman, " " commissioners' clerk,	50 00
2150	Leonard N. Austin, Jr., salary as commissioners' clerk,	75 00
2151	Thomas C. Gushee, " " " " "	100 00
2152	Philip S. Chase, " " " " "	150 00
2153	Clinton D. Sellew, " " secretary of water com- missioners,	200 00
2154	William Corliss, " " water commissioner,	500 00
2155	Charles E. Carpenter, " " " " "	500 00
2156	Joseph J. Cooke, " " " " "	500 00
2157	John Funnell, " " janitor, &c.,	57 04
2158	Charles H. Pierce, paid by him for sundries,	210 79
2159	Charles H. Pierce, " " " " labor,	1,094 79
2160	Samuel M. Gray, engineering services, self and assistants,	519 50
2161	Samuel M. Gray, paid by him for labor,	231 15
2162	Samuel M. Gray, " " " " sundries,	95 80
2163	William H. Miller & Co., bolts and nuts, repairing tools, &c.,	445 33
2164	Daniel F. Burlingame, repairing tools, &c.,	48 92
2165	Wood & Winsor, labor, pipe and fittings,	11 04
2166	Thomas Phillips & Co., galvanized iron, lead, &c.,	20 17
2167	George W. Smith, cutting curbstones for hydrant boxes,	14 00
2168	Butler, Brown & Co., copper wire cloth, (charged to R. I. Locomotive Works,)	53 07
2169	Abbott Lawrence, expressage on meters,	19 10
2170	J. M. Baker, labor, &c.,	10 76
2171	Walter Coleman & Sons, snatch blocks,	11 50
2172	Olney Brothers, oil,	10 87
2173	American Screw Co., screws, (charged to Architectural Iron Works,)	29 60
2174	Providence Builders' Association, materials for connecting drinking trough with sewer,	6 99
2175	Union Water Meter Co., repairing meters,	38 20
		<hr/>
		\$154,701 41

REPORT OF THE WATER COMMISSIONERS.

25

RECEIVED FROM JUNE 1, 1875, TO AUGUST 31, 1875, INCLUSIVE,
AND PAID TO THE CITY TREASURER.

1875.

June	5.	Of John Smurthest, for three months' rent of farm in Warwick, purchased of Richard U. Rhodes and wife, to September 1, 1875,	56 25
		Of Samuel M. Gray, for sundries,	11 22
		Of James Smith, for hose,	7 00
	12.	Of Daniel M. Lufkin, for one month's rent of farm in Warwick, purchased of Miss Patience W. Chace, to June 12, 1875,	14 58
	19.	Of Charles R. Dennis, for laying a temporary pipe in Adelaide avenue,	150 00
		Of A. N. Beckwith, for earth from Hope Reservoir,	1 62
	30.	Of George B. Inman, for labor and materials,	5 64
July	1.	Of Henry L. Johnson, for three months' rent of land in Pawtuxet, to July 1, 1875,	21 75
	2.	Of City of Providence, for sewer expenses,	2,327 18
	7.	Of Peleg P. Cranston, for three months' rent of "Randall Estate," so called, to July 1, 1875,	50 00
	12.	Of Daniel M. Lufkin, for one month's rent of farm in Warwick, purchased of Miss Patience W. Chace, to July 12, 1875,	14 58
		Of Commissioners of North Burial Ground, for cup, chain, &c.,	5 00
		Of John F. Parks, for stones from Hope Reservoir,	22 00
		Of Ellery Millard, for soil, " "	10 00
	20.	Of Fuller Iron Works, for scrap iron,	647 10
		Of Samuel M. Gray, for soil from Hope Reservoir,	6 79
	31.	Of Samuel M. Gray, for stones, from Hope " "	10 25
August	5.	Of John Smurthest, for three month's rent of farm in Warwick, purchased of Richard U. Rhodes and wife, to December 1, 1875,	56 25
	12.	Of Daniel M. Lufkin, for one month's rent of farm in Warwick, purchased of Miss Patience W. Chace, to August 12, 1875,	14 58
	20.	Of Fuller Iron Works, for scrap iron,	34 20
		Of Samuel M. Gray, for sundries,	4 75
	25.	Of George H. Burnham, for dwelling house at Hope pumping station, sold at auction,	310 00
	28.	Of City of Providence, for sewer expenses,	510 59
	31.	For setting and repairing meters during the present quarter,	917 31
		For laying service pipes during the present quarter,	816 19
		For couplings for street sprinklers during the present quarter,	4 60
		For meters during the present quarter,	3,799 00
		For water during the present quarter,	21,177 88
		For penalties during the present quarter,	23 00
			<hr/> \$31,028 31

TRIAL BALANCE OF LEDGER, AUGUST 31, 1875.

Dr.

Hope reservoir, for land,	.	.	117,876 65
" " " sundries,	.	.	1,755 31
" " " labor,	.	.	6,692 63
" " " gate chambers,	.	.	10,192 29
" " " gate houses,	.	.	2,708 70
" " " drain,	.	.	406 03
" " " inspection,	.	.	8,509 79
" " " conduit,	.	.	3,681 98
" " " slope wall,	.	.	43,127 81
" " " steps,	.	.	3,100 68
" " " iron railing,	.	.	24 92
Hope engine house,	.	.	105,144 84
Sockanosset reservoir, for construction,	.	.	177,870 72
" " " sundries,	.	.	124 45
" " " land,	.	.	14,435 36
" " " gate houses,	.	.	18,634 15
" " " drain,	.	.	2,431 13
" " " inspection,	.	.	6,819 18
" " " extra work and mate-	.	.	
rials,	.	.	189 70
" " " gate chambers,	.	.	19,299 27
" " " improvement of	.	.	
grounds,	.	.	9,534 02
" " " steps,	.	.	3,235 94
Lincoln reservoir, for land,	.	.	2,043 09
Line of leading mains, for labor and materials,	.	.	19,950 30
" " " " " extra trenching, etc.,	.	.	472 45
" " " " " land and damages,	.	.	1,665 00
Force main line, for land and damages,	.	.	3,006 35
" " " " " labor and materials,	.	.	5,153 53
" " " " " extra trenching, etc.,	.	.	332 56
Office furniture, stoves, gas fixtures, etc.,	.	.	1,304 23
Rent of offices,	.	.	2,680 56
Books, stationery, etc.,	.	.	630 96
Fuel and lights,	.	.	217 08
Horse hire by commissioners,	.	.	19 00
Traveling expenses of commissioners,	.	.	161 92
Janitor of rooms,	.	.	447 20
Commissioners' salaries,	.	.	21,042 16
Secretary's salary,	.	.	2,455 56
Clerks' salaries,	.	.	3,836 53
Sundries,	.	.	348 94
Printing,	.	.	2,116 65
Advertising,	.	.	1,929 88
Amount carried forward,	.	.	\$625,609 50

REPORT OF THE WATER COMMISSIONERS.

27

Amount brought forward,	\$625,609 50
Fences,	2,075 38
Rent of wharves and pipe yards,	7,050 21
Stop valves,	69,607 39
Linking curved pipes,	232 75
Store house and work shop,	1,208 98
Tools,	10,984 54
Labor on pipes,	18,543 01
Cast iron water pipes,	1,333,598 48
Special castings,	100,134 83
Lumber,	1,576 30
Fire hydrants,	100,120 46
Sockanosset hill cross road,	3,855 38
Telegraph lines,	2,228 84
Dwelling houses at Pettaconset,	10,061 90
Culverts and bridge on line of force mains,	6,775 33
Culverts at Pettaconset,	3,557 92
Real estate in Warwick,	11,530 59
Water privileges, mill and other real estate in Pawtuxet,	45,702 90
Pochasset bridge,	5,559 82
Wharf salaries,	10,124 48
Temporary engine house at Pettaconset,	9,775 86
Roads, slopes, &c., at Pettaconset,	12,042 95
Engine house at Pettaconset,	300,738 04
Natural filter basin,	41,518 35
Removing loam,	462 95
Iron screw piles,	3,766 46
Hydrant bolts,	1,940 78
Pipe bolts,	1,853 71
Photographs,	328 25
Hydrant heads,	7,443 00
Taps and stops,	17,912 73
Valve covers,	9,377 56
Service pipe,	46,732 36
Hydrant boxes,	28,706 67
Setting fire hydrants,	10,557 29
Check valves,	1,412 48
Valve boxes,	31,923 39
Air cocks, boxes, covers and setting,	526 12
Setting blow-offs,	331 49
Pettaconset pumping station, for land,	25,901 27
G. B. & W. F. Inman,	5 29
Lobdell & Newmans,	183,025 00
A. & W. Sprague Manufacturing Company,	2,500 00
Paulding, Kemble & Co.,	102,027 43
Thomas Phillips & Co.,	2,583 84
Heirs of Joseph Harris,	32 58
James Glass,	3,580 31
Providence Steam Engine Co.,	22,018 12
Amount carried forward,	\$3,239,163 17

Amounts brought forward,	\$3,229,163 17
Rhode Island Locomotive Works, . . .	18,110 36
Architectural Iron Works, . . .	30,453 77
Ryder Reciprocal Grate Association, . . .	17 07
Foster S. Dennis, . . .	8,500 00
Sewer Department, salaries and office expenses, . . .	1,003 17
Samuel M. Gray, . . .	500 60
Fales, Jenks & Sons, . . .	50
City Treasurer, . . .	223,700 36
City Treasurer, for water payments, . . .	405,841 82
Testing pipe iron, . . .	443 50
Iron drain pipes and gate, . . .	224 21
Carting pipes, . . .	39,815 58
Counsel fees, . . .	5,500 00
Inspection of pipes, . . .	10,562 23
Testing bolts and composition castings, . . .	34 25
Laying water pipes, . . .	389,931 67
Laying service pipes, . . .	30,934 75
Laying suction pipe, etc., . . .	85 00
Drainage pump and engine, . . .	5,110 72
Hydrants for street sprinklers, . . .	2,633 15
Inspection of pipe laying, . . .	31,254 12
Temporary boarding house at Pettaconset, . . .	1,428 38
Public drinking fountains and troughs, . . .	2,882 64
Warwick test pits, . . .	1,313 40
Engine house at Pettaconset, for drain, . . .	2,132 37
Water meters set belonging to the city, . . .	1,258 72
Worthington pumping engine, . . .	35,522 33
Hope pumping engine, . . .	63,104 67
Cornish pumping engine, . . .	8,682 55
Keeper's house at Sockanosset reservoir, . . .	7,088 84
Pipe in river embankment at Pettaconset, . . .	4,067 82
Inspection of engine work, . . .	2,937 08
Alterations at Hope pumping station for second engine, . . .	617 04
Boilers for Cornish engine, . . .	5,900 33
Stand pipe at Pettaconset, . . .	46 94
	<hr/> \$4,580,802 51

ENGINEERING DEPARTMENT:—

For Instruments, . . .	\$3,357 41
Tools, . . .	728 55
Furniture, stoves, gas fixtures, etc., . . .	2,883 57
Draughting, . . .	3,523 52
Labor, . . .	9,088 07
Horse and wagon account, . . .	2,744 60
Horse keeping, shoeing, etc., . . .	2,340 68
Horse hire, . . .	4,985 63
Rent of offices, . . .	6,692 97
Amounts carried forward,	<hr/> \$30,345 02 \$4,580,802 51

Amounts brought forward,	\$36 345 02	\$4,580,802 51
Fuel and lights,	706 19	
Janitor of rooms,	1,234 11	
Experimental filter,	91 08	
Books, stationery, etc.,	3,428 86	
Sundries,	3,485 78	
Test wells,	1,579 40	
Consultations,	827 08	
Office building at Pettaconset,	567 60	
“ “ “ Sockanosset reservoir,	563 22	
Stakes and strips,	1,284 32	
Printing,	562 03	
Maps,	105 42	
Service pipe experiments,	296 04	
Temporary assistance,	10,086 48	
Salaries,	117,651 41	
		178,814 64

MAINTENANCE:—

Hope pumping station, for coal and wood,	\$7,141 69	
“ “ “ “ engineers,	3,082 56	
“ “ “ “ firemen,	1,864 65	
“ “ “ “ lights,	1,491 90	
“ “ “ “ sundries,	540 28	
“ “ “ “ night and Sunday watch,	41 23	
Pettaconset pumping station, for coal and wood,	24,993 33	
“ “ “ “ engineers,	6,500 84	
“ “ “ “ firemen,	5,867 03	
Pettaconset pumping station, for labor on fuel,	2,283 27	
“ “ “ “ sundries,	4,497 97	
“ “ “ “ night and Sunday watch,	2,576 73	
Sockanosset reservoir, for watch,	3,329 25	
“ “ “ “ sundries,	4,660 00	
Hope reservoir, for watch,	160 00	
Ascertaining and removing nuisances on Pawtuxet river,	479 46	
Worthington pumping engine,	7,643 37	
Hope pumping engine,	4 66	
Miller boilers at Pettaconset,	137 66	
Change of grades,	1,639 94	
Inspection of water fixtures,	4,635 81	
Repairs on pipe line,	8,492 92	
Meter testing room,	270 91	
Setting, inspection and repair of meters,	609 50	
Commissioners' salaries,	7,333 37	
Secretary's salary,	2,455 60	
Clerks' salaries,	5,496 69	
Rent of offices,	1,218 04	
Amounts carried forward,	\$109,448 66	\$4,750,616 55

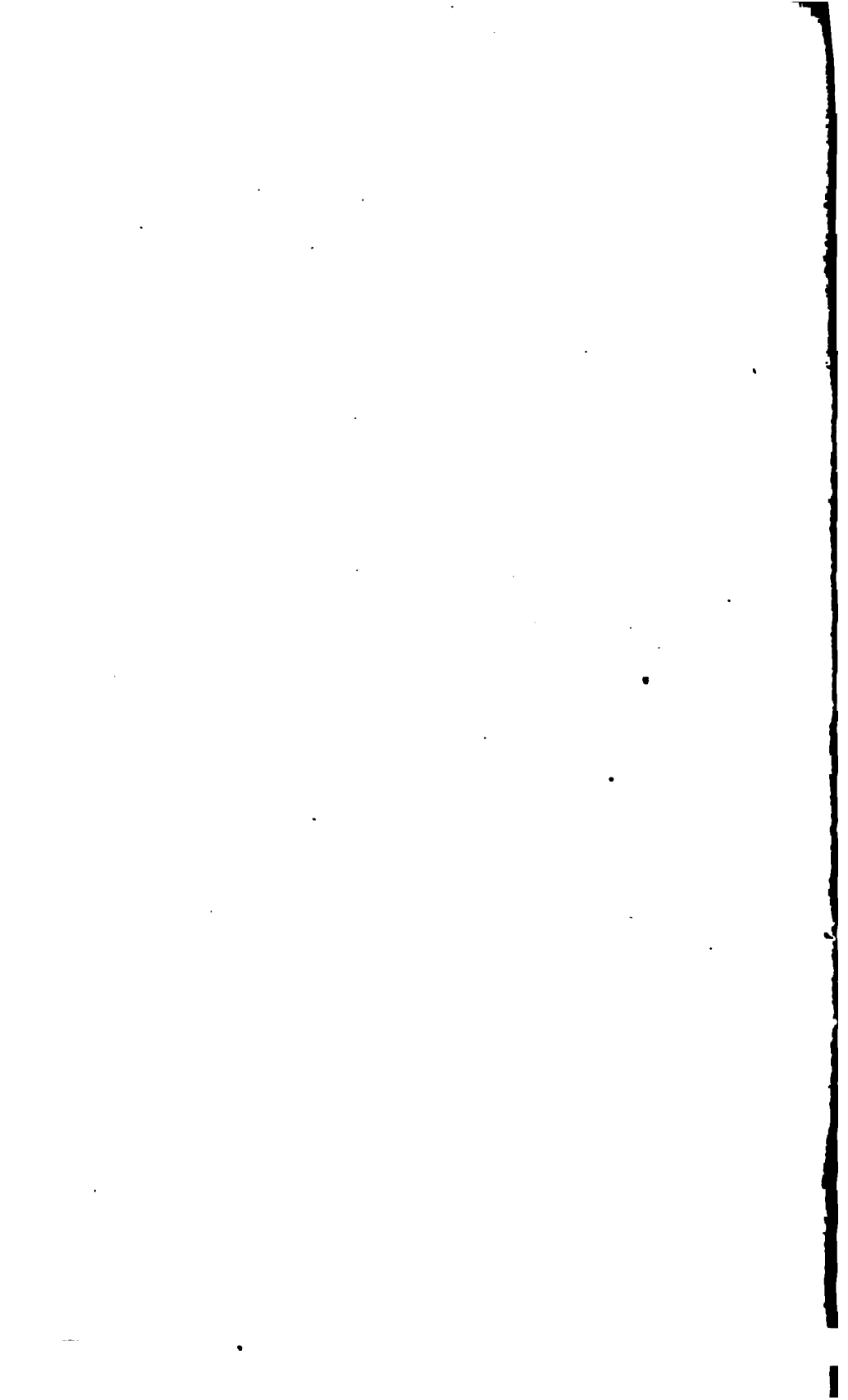
Amounts brought forward,		\$109,448 66	\$4,759,616 55
Fuel and lights,	.	56 68	
Janitor of rooms,	.	244 21	
Books, stationery, &c.,	.	633 96	
Printing,	.	673 61	
Advertising,	.	83 41	
Sundries,	.	337 35	
Counsel fees,	.	1,000 00	
Thawing pipes, gates, &c.,	.	1,264 82	
Supplying water takers by reason of frost,	.	1,280 38	
Engineering department, for rent of offices,	.	2,542 08	
“ “ “ fuel and lights,	.	131 07	
“ “ “ janitor of rooms,	.	499 84	
“ “ “ books, stationery, &c.,	.	161 38	
“ “ “ printing,	.	166 07	
“ “ “ salaries,	.	15,308 50	
“ “ “ sundries,	.	13 24	
			133,845 26
			<u>\$4,893,461 81</u>

CR.

W. A. Burdick, Agent,	.	550 00	
Boston hydrants,	.	29 07	
Water meters,	.	1,921 08	
Penalties,	.	340 00	
Water,	.	405,841 82	
Approved bills,	.	4,484,779 84	
			<u>\$4,893,461 81</u>

**SCHEDULE OF RECEIPTS FOR WATER, BY MONTHS, FROM
COMMENCEMENT TO AUGUST 31, 1875, INCLUSIVE.**

MONTHS.	1872.	1873.	1874.	1875.
January.....	.....	\$40,699 09	\$69,356 70	\$92,102 10
February.....	\$796 06	4,314 80	3,678 96	4,674 19
March.....	6,671 82	6,669 73	9,221 19	4,777 42
April.....	1,668 59	2,810 07	4,936 98	10,093 32
May.....	2,063 41	1,766 28	2,338 59	2,574 92
June.....	8,634 89	8,228 92	2,583 35	8,140 99
July.....	3,488 27	6,214 24	13,756 51	9,035 23
August.....	1,818 14	1,441 09	1,953 37	4,001 66
September.....	4,933 44	7,550 64	5,541 34	.....
October.....	5,079 08	8,745 53	9,097 95	.....
November.....	477 04	872 83	1,511 03	.....
December.....	5,372 77	8,072 87	8,076 42	.....
	\$41,003 51	\$97,386 09	\$132,052 39	\$135,399 83



1875.]

CITY DOCUMENT.

[No. 47.]

SEVENTH QUARTERLY REPORT
OF THE BOARD OF
WATER COMMISSIONERS
OF THE
CITY OF PROVIDENCE.

[Elected February 27, 1874.]

DECEMBER 1, 1875.



PROVIDENCE:

ANGELL, BURLINGAME & CO., PRINTERS TO THE CITY.
1875.

1875.]

CITY DOCUMENT.

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SEVENTH QUARTERLY REPORT

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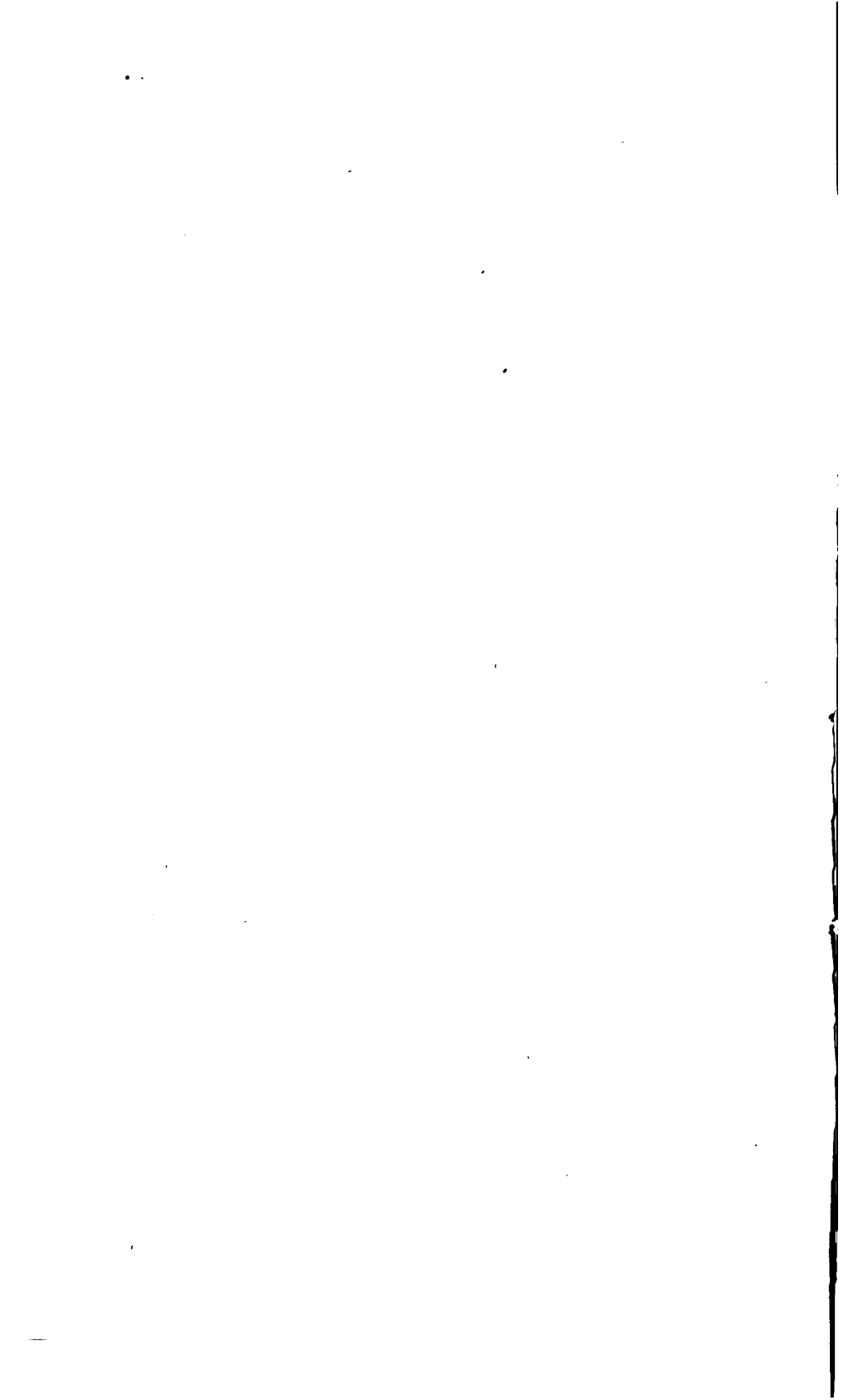
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1875.



ORGANIZATION
OF THE
PROVIDENCE WATER WORKS.

BOARD OF WATER COMMISSIONERS.

JOSEPH J. COOKE, PRESIDENT.

CHARLES E. CARPENTER,

WILLIAM CORLISS.

SECRETARY OF THE BOARD OF WATER COMMISSIONERS.

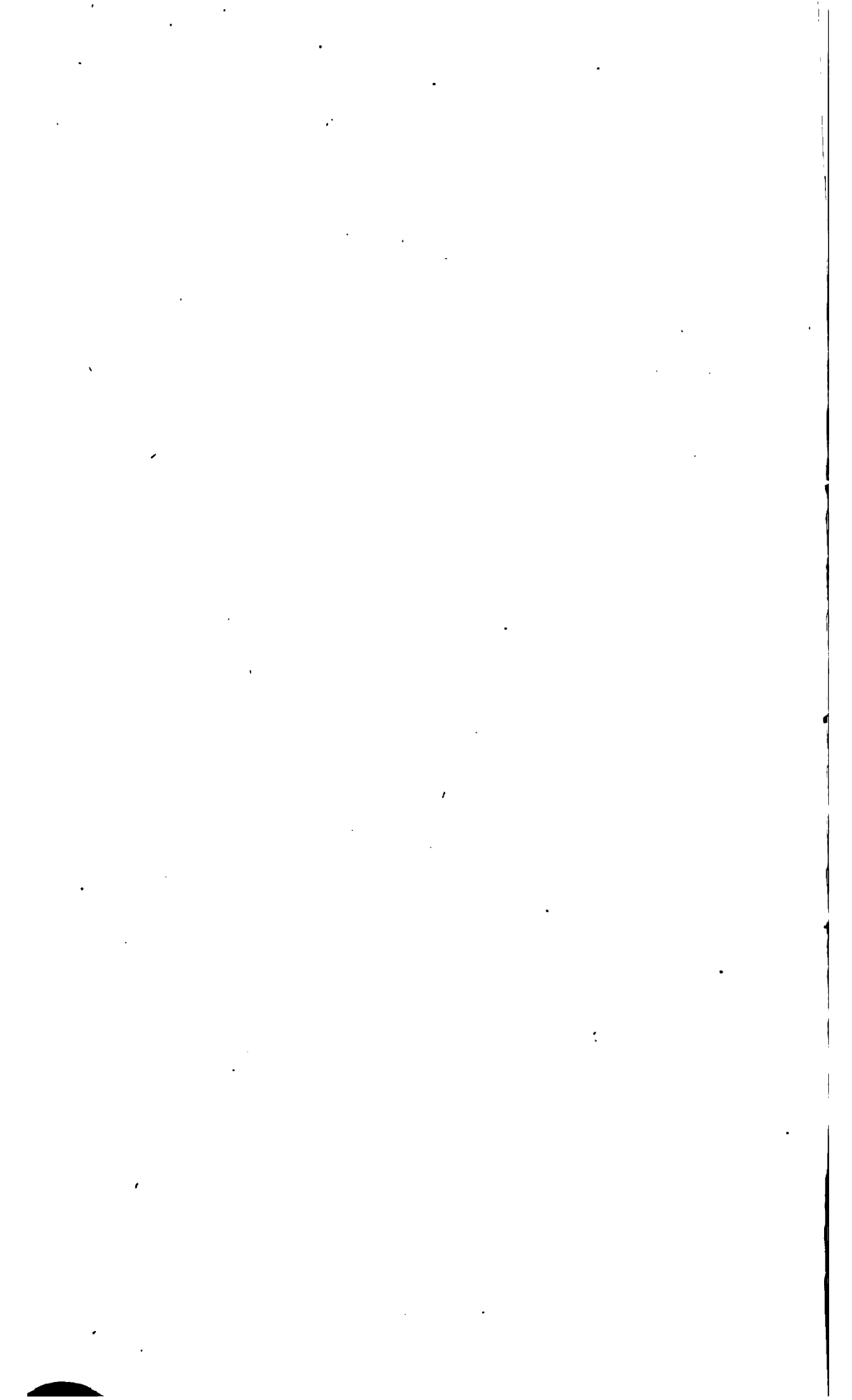
CLINTON D. SELLEW.

Office No. 35 North Main Street.

CHIEF ENGINEER.

J. HERBERT SHEDD.

Office No. 35 North Main Street.



REPORT.

OFFICE OF THE BOARD OF WATER COMMISSIONERS, }
Providence, R. I., December 1, 1875. }

TO THE HONORABLE THE CITY COUNCIL:

The undersigned Water Commissioners, elected February 27, 1874, under an "An Ordinance to establish a Board of Water Commissioners," approved same day, respectfully present their Seventh Quarterly Report:

An offer of Samuel B. Pearce to furnish the materials and erect a fence on the south side of Hope Reservoir, has been accepted.

An offer of the Architectural Iron Works, of New York, to furnish the materials and erect an iron bridge over the overflow at Hope Reservoir, as per plans, for the sum of three hundred and seventy-five dollars, (\$375.00,) has been accepted.

Advantage was taken of the filling of Hope Reservoir to draw all the water from Sockanosset Reservoir, for the purpose of examining its bottom with reference to sediment, (of which, unexpectedly, a mere *film* was found,) and to clear the reservoir of fish. The quantity of fish, also, was smaller than was anticipated. A small quantity of fine earth has been carted in, spread over the bottom and thoroughly rolled, for

the purpose of lessening the very slight amount of filtration. The reservoir is now again nearly full of water.

The engine for Hope Pumping Station, constructed by the Providence Steam Engine Company, being the second engine constructed for that station, has been erected, and now awaits the test required by the contract, before acceptance.

An agreement has been executed with the Providence Steam Engine Company, appointing Messrs. Charles Hermany, of Louisville, Kentucky, and James B. Francis and Channing Whitaker, both of Lowell, Massachusetts, the committee of experts provided for in the contract for the construction and erection of said engine, and it is expected that the test will be made about the middle of the present month.

On Friday, the 10th day of September, Simeon Noell, Inspector of Engine Work, while standing upon the platform around the cylinder where he was superintending the placing of the piston in the steam cylinder of the Cornish Pumping Engine at Pettaconset, was very seriously injured, losing a portion of his skull and one eye, by the fall of a block, caused by the breaking of a connecting strap. Mr. Noell is now at the Rhode Island Hospital, and is slowly improving.

John West, of Reading, Pennsylvania, has been engaged to act as consulting and superintending engineer in charge of the Cornish Engine at Pettaconset, and of the running of the engine for thirty days after starting, for the sum of twenty-five hundred dollars, (\$2,500.00), in full for services and all expenses.

Neither the Engine House at Pettaconset nor the Cornish Engine have been completed.

The daily consumption of water, including waste and leakage, during the last quarter, was about 2,311,000 gallons.

Plumbers' licenses have been issued as follows :
James T. Fish, Agent, Joseph Groves, George R. Howard.

On the 1st day of September, 1875, Michael J. Higgins was notified to show cause why his license as Plumber should not be revoked, and that in the meantime his license was suspended. Mr. Higgins has made no appearance.

The whole number of plumbers' licenses issued is sixty-four. Suspended, three. Revoked, one. Remaining in force, sixty

The following statement shows the length of pipes laid during the last quarter; the sizes of the pipes; where laid; and the totals since the commencement of the work:

36 INCH.

At Pettaconset,	-	-	-	-	88 feet.
Including 2 cut pipes.					
Previously,	-	-	-	-	9,996 feet.
Total,	-	-	-	-	<u>10,084 feet.</u>

8 INCH.

In McKenna and Square streets and at Pettaconset,	-	-	-	-	744 feet.
Including 8 cut pipes, 2 curved pipes, 5 branches and 3 gates.					
Previously,	-	-	-	-	73,615 feet.
Total,	-	-	-	-	<u>74,359 feet.</u>

6 INCH.

In Borden, Carter, Crary, George, Grove, Halton, Langley, Mill, Pearl, Pike, Royal, Sackett, Sayles and Westfield streets; in Angell and Doyle places, and at Pettaconset,	-	7,165 feet.
Including 23 cut pipes, 15 curved pipes, 19 branches and 13 gates.		

Previously,	-	-	-	-	-	386,931 feet.
Total,	-	-	-	-	-	394,096 feet.
Total of all sizes during the last quarter,						7,997 feet.
or $1\frac{514}{1000}$ miles.						
Previously, including 10, 12, 16, 20, 24 and 30						
inch, of which none have been laid during the						
last quarter,	-	-	-	-	-	625,475 feet.
Total,	-	-	-	-	-	633,472 feet.
or $119\frac{275}{1000}$ miles.						

Twenty-one fire hydrants have been set during the last quarter, one in each of the following locations:—

Atwell's avenue, north side, in range of west line of Julian street.

Borden street, north side, 180 feet east of Clay street.

" " " " 144 " east of Plane street.

Bourbon " south side, about 450 feet east of Greenwich street.

Bridgham street, east side, opposite north line of Gilbert street.

Grove street, south-west corner of Harris avenue.

" " south side, about 130 feet east of Valley street.

Halton " west side, about 220 feet south of Potter's avenue.

Hope street, west side, half way between Cushing and Bowen streets.

Manton avenue, south-west side, opposite northwest line of Steere avenue.

Myrtle street, north-east corner of Pine street.

Royal " north side, about 190 feet east of North Main street.

Sackett street, north side, 182 feet west of Broad street.

" " " " 590 " " " " "

Sayles " " " in line with east side of Searle street.

Somerset street, north-east corner of Hayward street.

Square " north-east corner of Louisa street.

Stewart court, north-east corner of Garden street.

West Clifford street, south-west corner of Myrtle street.

" " " " " " Somerset street.

Westfield " south side, about half way between
Greenwich and Fuller streets.

The total number of fire hydrants is now nine hundred and one.

The height of water in Sockanosset Reservoir at 7 o'clock this morning was 178.84. High water in the reservoir is 180.50 (above high tide in Providence river.)

The height of water in Hope Reservoir at 7 o'clock this morning was 161.96. High water in the reservoir is 162.50 (above high tide in Providence river.)

Sixty-two Ball & Fitts' water meters, made by the Union Water Meter Co., and forty water meters, made by Fales, Jenks & Sons, have been put in at the expense of water takers since the date of the last report. One one-inch water meter, made by Fales, Jenks & Sons, has been changed for a three-quarter inch meter of the same make, and the use of one three-quarter inch Fales, Jenks and Sons' meter, has been discontinued. The use of three five-eighths inch water meters, made by the Union Water Meter Co., has also been discontinued.

There are now twenty-two hundred and fifty-six water meters in use, viz.:—

KIND.	SIZES.							TOTALS.
	$\frac{3}{8}$ inch.	$\frac{1}{2}$ inch.	1 inch.	$1\frac{1}{2}$ inch.	2 inch.	3 inch.	4 inch.	
Ball & Fitts.	1,301	225	82	45	8	1	1	1,663
Worthington.	169	....	....	....	....	..	1	170
Fales, Jenks & Sons.....	....	404	19	....	....	....	....	423
	1,470	629	101	45	8	1	2	2,256

The total number of applications for a supply of water is sixty-seven hundred and forty-eight.

The number of new service stops opened during the last quarter, is two hundred and seventy-nine.

The number of service stops opened to date is fifty-seven hundred and ninety-six.

Nine stops have been closed during the last quarter, for non-payment of bills, four of which have been re-opened on payment of bill and a penalty in each case of two dollars; and one was re-opened on payment of the bill, without charge for penalty, for reason of attendant circumstances. Three stops previously closed for non-payment have been re-opened during the last quarter; in one case the bill and a penalty of two dollars were paid, and the remaining two, for reason of attendant circumstances, were re-opened on payment of bill, without penalty. Thirty-three stops closed for non-payment remain unopened; in one case, however, the bill and penalty of two dollars have been paid, but the party is not ready to have the stop re-opened. The use of four stops has been discontinued, but the pipes remain in view of possible future use.

Water is now supplied for the following uses:—

3 armories; 10 bakeries; 36 banks; 98 bar-rooms; 2 bath houses; 1 bath house—Turkish; 115 boarding houses; 9 bottling establishments; 31 building purposes; 1 burying ground; 1 car house; 2 carriage depositories; 3 chasers; 1 Christian Union; 29 churches; 1 city barn; 2 city bridges; 1 city building; 14 city drinking fountains; 25 city drinking troughs; 901 city fire hydrants; 5 city fire steamer stations; 9 city hose stations; 8 club rooms; 14 coal yards; 1 college; 1 colored shelter; 1 conservatory of music; 4 convents; 2 court houses; 1 decorator; 1 Dexter Asylum; 2367 dwellings of one family; 2341 dwellings of two families; 220 dwellings of three families; 266 dwellings of four families; 30 dwellings of five families; 51 dwellings of six families; 4 dwellings of seven families; 7 dwellings of eight families; 1 dwelling of nine families; 1 dwelling of twelve families; 2 dye houses; 8 elevators; 1 engine turner; 4 engravers; 2 enamel works; 1 express carriage house; 53 fire supplies, private; 61 fountains, private; 1 fountain, public; 1 furrier; 3052 garden and street hydrants; 4 gas holders; 5 gold and silver platers; 6 gold and silver refiners; 2 grain elevators; 39 green houses; 20 halls; 1 home for aged women; 2 hospitals; 17 hotels; 1 infirmary; 4 laundries; 3 libraries; 1 lithographer; 21 lodging houses; 2 lumber dealers; 1 mason. *Manufacturing establishments*,—1 beer; 2 belt and picker; 3 blank book; 2 bleacheries; 1 bologna sausage; 1 bonnet bleachery; 2 boot and shoe; 1 box; 1 braiding works; 2 brass foundries; 2 breweries; 1 brush; 2 butt; 1 butter; 9 carriage; 2 cement pipe; 1 chain; 6 cigar; 1 cigar box; 18 cloak and dress; 1 coffin; 8 confectionery; 1 corset; 3 colorers of jewelry; 8 cotton; 1 crocus; 3 die sinkers; 2 dye wood; 1 emery wheel; 1 enameler of jewelry; 1 eyelet; 3 file; 9 furniture; 1 gas; 1 gas burner; 4 gas fixtures; 1 geer; 3 hat; 4 harness; 1 horse shoe; 2 ice cream and soda water; 1 iron company; 1 iron fence; 10 iron foundries; 1 japan switch; 1 jewelers' cards; 93 jewelry; 4 lapidaries; 28 machinists; 1 mowing machine; 1 nail keg; 2 oil; 1

organ ; 1 paper box ; 1 paper collar ; 3 paper cop tube ; 1 pattern ; 4 patent medicine ; 1 pencil case ; 4 picture frame ; 1 paint works ; 2 pump ; 2 reed ; 1 rubber goods ; 1 rubber tubing ; 4 sash and blind ; 1 saw ; 2 screw ; 1 sheet iron ; 1 shell comb ; 2 shirt ; 3 silverware ; 6 soap ; 1 spiral spring ; 1 starch ; 1 steam boiler ; 2 steam engine ; 1 stencil plate ; 1 stove ; 2 tanners ; 2 thread ; 1 tinware ; 4 tool ; 3 top roll ; 6 woolen goods ; 1 yeast. *Markets*,—48 fish ; 106 meat. *Mills*,—2 drug and grain ; 3 flour and grain ; 1 paint ; 10 planing. 5 marble works ; 1 nickel plater ; 1 opera house ; 2 orphan asylums ; 5 organs ; 4 oyster houses ; 560 offices ; 11 photographers ; 10 printing establishments ; 7 plaster and stucco workers ; 10 plumbers ; 10 provision curers and packers ; 6 police stations ; 7 railroads ; 1 reading room ; 44 restaurants ; 1 roofer. *Saloons*,—4 billiard ; 3 bowling ; 6 ice cream ; 26 lager beer ; 11 oyster. *Schools*,—1 boarding ; 14 private ; 37 public ; 1 reform. *Shops*,—45 barber ; 9 blacksmith ; 1 carpenter ; 3 cooper ; 1 gunsmith ; 1 junk ; 17 paint ; 5 shoemaker ; 23 tailor ; 5 tinman. *Stables*,—6 hack ; 48 livery ; 294 private ; 5 sale ; 70 work. 13 steamboats ; 13 steamships ; 6 steam and gas pipe fitters. *Stores*,—1 agricultural implements ; 45 apothecary ; 1 auction ; 4 book ; 32 boot and shoe, 2 carpet ; 2 carriage trimmings ; 11 cigar ; 24 clothing ; 11 confectionery ; 3 drug ; 40 dry goods ; 80 fancy goods ; 1 florist ; 11 flour and grain ; 12 fruit ; 12 furniture ; 12 gents' furnishing goods ; 144 grocery, retail ; 15 grocery, wholesale ; 11 hardware ; 2 hide and leather ; 2 hoop skirt ; 11 house furnishing goods ; 3 house paper ; 3 iron and steel ; 12 jewelry ; 14 liquor ; 1 lime and brick ; 2 manufacturers' supplies ; 33 millinery ; 10 newspaper ; 4 oil and paint ; 2 paper and paper stock ; 1 piano forte ; 7 produce, wholesale ; 3 sewing machine ; 4 stationery ; 2 stove ; 5 tea ; 2 trunk ; 1 toy ; 1 umbrella ; 2 wooden ware ; 1 wool ; 2 woolen goods. 1 State prison ; 1 store house ; 1 theatre ; 4 undertakers ; 1 United States custom house building ; 2 upholsterers ; 2 water boats ; 1 wheelwright ; 1 wood turner ; 3 wood yards ; 28 not classed.

The amount of expenditures during the last quarter, is - - - \$103,481 42
 The total amount of expenditures, is 4,588,261 26
 The total amount of appropriations, is 4,700,000 00
 The unexpended balance, is - - - 111,738 74

The cost of construction to date, (deducting from the whole amount of approved bills the cost of maintenance, the amounts received for labor and materials, &c.; meters; from sewer department for office expenses; estimated amount due from sewer department for engineering, &c.; and adding amounts to the credit of Boston hydrants and water meters,) is \$4,175,592 83

The cost of maintenance to date, is 148,702 64

The amount received during the last quarter, all of which has been paid to the City Treasurer, is

For water supplies,	-	\$20,263 39	
For water meters,	-	2,530 00	
For penalties,	-	12 00	
For sundries,	-	6,163 53	
			28,968 92

The amount received for water in 1872, was 41,003 51

The amount received for water in 1873, was 97,386 09

The amount received for water in 1874, was 132,052 39

The amount received for water during eleven months of 1875, was - - - 155,663 22

The total amount received for water to date, is 426,105 21

The amount of all receipts to date, is 658,511 10

A schedule of bills approved during the last quarter, and of receipts during the same time, a trial balance of ledger, November 30, 1875, and a schedule of receipts for water by months, are hereunto appended and made parts of this report.

A separate report of that portion of the duties of the Board which relates to sewers will be presented.

JOSEPH J. COOKE,	{	<i>Board of</i>
CHAS. E. CARPENTER,		
WILLIAM CORLISS,		
		<i>Water Commissioners.</i>

**SCHEDULE OF BILLS APPROVED BY THE BOARD OF WATER
COMMISSIONERS FROM SEPTEMBER 1, 1875, TO NOVEMBER 30,
1875, INCLUSIVE.**

2176	George W. Olney, land in Lincoln,	-	-	\$900 00
2177	Samuel M. Gray, on account for paying laborers at Pettaconset,	-	-	500 00
2178	Paulding, Kemble & Co., on account for constructing pumping engine,	-	-	600 00
2179	Paulding, Kemble & Co., on account for constructing pumping engine,	-	-	134 50
2180	Foster S. Dennis, trenching, back-filling and laying water-pipes,	-	-	2,200 00
2181	Foster S. Dennis, carting pipes,	-	-	226 55
2182	Fuller Iron Works, special castings and valve boxes,	-	-	1,413 42
2183	Fales, Jenks & Sons, water meters,	-	-	823 15
2184	Hopkins & Pomroy, teaming,	-	-	97 25
2185	Samuel M. Gray, paid by him for labor at Pettaconset, &c.,	-	-	2,408 08
2186	Thomas Phillips & Co., tin-lined lead pipe, &c.,	-	-	804 73
2187	Tucker, Swan & Co., coal,	-	-	1,579 61
2188	Lobdell & Newmans, grooved roller,	-	-	100 00
2189	Samuel M. Gray, on account for paying laborers at Pettaconset,	-	-	500 00
2190	Hopkins & Pomroy, coal, &c.,	-	-	175 59
2191	Wood & Winsor, labor, pipe and fittings,	-	-	17 81
2192	R. S. Burrough & Co., oil,	-	-	53 12
2193	Tucker, Swan & Co., coal, &c.,	-	-	1,914 51
2194	G. M. Hopkins & Co., atlas of Providence, first, second and third wards, two copies,	-	-	24 00
2195	Ryder Reciprocal Grate Association, grate bars, &c.,	-	-	674 83
2196	Simeon Noell, on account for salary as inspector of engine work,	-	-	100 00
2197	Builders' Iron Foundry, check valves, special castings, &c.,	-	-	1,932 79
2198	Charles H. Pierce, salary as assistant engineer,	-	-	250 00
2199	Otis F. Clapp, " " " "	-	-	208 33
2200	Howard A. Carson, " " " "	-	-	250 00
2201	Charles H. Swan, " " " "	-	-	208 33
2202	William T. Schneider, " " " "	-	-	100 00
2203	John E. Bowen, " " " "	-	-	100 00
2204	Daniel D. Waterman, " " " "	-	-	83 33
2205	Leprillete Sweet, 2d, " " " "	-	-	83 33
2206	Edmund B. Weston, " " " "	-	-	83 33
2207	William M. Brown, Jr., " " " "	-	-	83 33
2208	Daniel C. Stone, " " " "	-	-	83 33
2209	Edwin P. Dawley, " " " "	-	-	83 33
2210	William F. Janes, " " service pipe "	-	-	83 33
2211	Augustus F. Nagle, " " mechanical "	-	-	200 00
2212	Frank B. Ferris, " " student, engineering department,	-	-	41 67
2213	Thomas L. Botts, " " " "	-	-	41 67
2214	William H. Olmstead, " " " "	-	-	41 67

Amount carried forward, - - - \$19,204 91

	Amount brought forward,	-	-	-	\$19,204 91
2215	George B Francis, salary as student, engineering department,	-	-	-	33 33
2216	Charles A. Harper, salary as student, engineering department,	-	-	-	33 33
2217	Alfred E. Martin, " " " " " "	-	-	-	33 33
2218	Charles F. Angell, " " " on trial, " "	-	-	-	20 00
2219	Albert L. Bodwell, " " " " " "	-	-	-	33 33
2220	Walter F. Slade, " " service pipe clerk, engineering department,	-	-	-	83 33
2221	William Apin, salary as clerk, engineering department,	-	-	-	83 33
2222	William H. Turner, " " " " " "	-	-	-	100 00
2223	Irvin H. Potter, " " " " " "	-	-	-	58 50
2224	Andrew B. Purdy, " " superintendent of pipe work,	-	-	-	166 67
2225	William H. Patterson, salary as inspector on pipe line, -	-	-	-	104 00
2226	S. Horace Wheeler, " " " of service pipes,	-	-	-	125 00
2227	Henry M. Wilcox, " " assistant inspector of service pipes, -	-	-	-	100 00
2228	Frederic A. Arnold, salary as inspector of water fixtures,	-	-	-	100 00
2229	Albert C. Winsor, " " assistant inspector of water fixtures, -	-	-	-	78 00
2230	Edward A. Moran, salary as inspector of meters,	-	-	-	100 00
2231	John Lyons, " " plumber, meter department,	-	-	-	38 75
2232	James H. Higgins, " " " " " "	-	-	-	65 00
2233	John Lally, " " plumber's helper, meter department, -	-	-	-	20 42
2234	Simeon Noell, salary as inspector of engine work, -	-	-	-	150 00
2235	Alexis C. Miller, " " keeper of Hope Reservoir, -	-	-	-	77 50
2236	Jéptha Baker, " " " Sockanosset Reservoir, -	-	-	-	77 50
2237	Albert E. Angell, salary as temporary assistant, engineering department, -	-	-	-	55 12
2238	George H. Slade, salary as temporary assistant, engineering department, -	-	-	-	56 40
2239	Edward C. Reynolds, salary as temporary assistant, engineering department, -	-	-	-	18 75
2240	George W. Winsor, Jr., salary as temporary assistant, engineering department, -	-	-	-	37 50
2241	C. Frank Parkhurst, salary as temporary assistant, engineering department, -	-	-	-	8 00
2242	Henry G. Dennis, salary as superintendent of pipe yard, -	-	-	-	125 00
2243	Richard M. Wood, " " clerk at pipe yard, -	-	-	-	83 33
2244	John Outhbert, " " pumping engineer, Pettaconset,	-	-	-	104 17
2245	John Hamilton, " " " " " "	-	-	-	85 00
2246	George F. Barney, " " fireman, " "	-	-	-	60 00
2247	Patrick O'Rourke, " " " " " "	-	-	-	70 00
2248	John Quinn, " " pumping engineer, Hope station,	-	-	-	125 00
2249	Joseph F. Plant, " " " " " "	-	-	-	90 00
2250	Thomas Miller, " " fireman, " "	-	-	-	65 00
2251	Michael Hamill, " " " " " "	-	-	-	65 00
2252	William F. Tanner, " " axeman, -	-	-	-	49 00
2253	Jesse W. Coleman, " " commissioners' clerk, -	-	-	-	50 00
2254	Leonard N. Austin, Jr., salary as commissioners' clerk,	-	-	-	75 00
2255	Thomas C. Gushee, " " " " " "	-	-	-	100 00
	Amount carried forward, -	-	-	-	\$22,208 50

	Amount brought forward,	-	-	\$22,208 50
2256	Philip S. Chase, salary as commissioners' clerk,	-	-	150 00
2257	Clinton D. Sellew, " " secretary of water commissioners,	-	-	200 00
2258	John Purnell, " " as janitor, &c.,	-	-	55 96
2259	Charles H. Pierce, paid by him for sundries,	-	-	88 78
2260	Charles H. Pierce, " " " labor,	-	-	1,116 69
2261	Samuel M. Gray, engineering services, self and assistants,	-	-	515 02
2262	Samuel M. Gray, paid by him for sundries,	-	-	88 22
2263	Dexter Gorton & Co., carpenter's work, lumber, &c.,	-	-	99 31
2264	Daniel F. Burlingame, repairing tools, &c.,	-	-	18 30
2265	Boston Machine Co., water gates,	-	-	305 10
2266	Gorham M'fg Company, cups and rings for drinking fountains,	-	-	33 75
2267	Olney Brothers, oil,	-	-	43 30
2268	Robert Morrow, horse hire by engineers,	-	-	21 00
2269	Stephen Knobb, carting check valve to Pettaconset,	-	-	20 00
2270	W. E. Barrett & Co., lawn seed,	-	-	8 00
2271	H. B. Bowen, pipe bolts,	-	-	79 99
2272	Abbott Lawrence, expressage on meters,	-	-	12 75
2273	Buff & Berger, repairing and adjusting level,	-	-	20 50
2274	Holden & Lovett, horse shoeing,	-	-	14 50
2275	French & MacKenzie, on account for carpenter's work, engine house at Pettaconset,	-	-	1,800 00
2276	James Glass, on account for slating roof of engine house at Pettaconset,	-	-	800 00
2277	William H. Waterman, allowance for service pipe,	-	-	17 73
2278	R. S. Burrough & Co., oil,	-	-	91 20
2279	B. F. Almy, cop waste,	-	-	12 00
2280	Tillinghast & Sherman, matting,	-	-	52 67
2281	Foster S. Dennis, extra labor laying water pipes, &c.,	-	-	11 12
2282	Willard F. Inman, carting pipes,	-	-	30 62
2283	Louis W. Clarke, repairing telegraph line,	-	-	10 68
2284	John West, on account for services as consulting and superintending engineer,	-	-	500 00
2285	Rhode Island Locomotive Works, on account for boilers and stand-pipe at Pettaconset,	-	-	10,000 00
2286	Samuel M. Gray, paid by him for labor,	-	-	2,518 53
2287	Samuel M. Gray, " " " " "	-	-	368 50
2288	Providence Gas Co., gas,	-	-	94 38
2289	Tucker, Swan & Co., coal, &c.,	-	-	475 03
2290	Dexter Gorton & Co., carpenter's work, lumber, &c.,	-	-	1,521 54
2291	Thomas Phillips & Co., tin-lined lead pipe, &c.,	-	-	1,304 88
2292	Lawton & Lee, whitening walls of offices,	-	-	36 31
2293	Fales, Jenks & Sons, water meters,	-	-	507 45
2294	Foster S. Dennis, carting pipes,	-	-	14 93
2295	Foster S. Dennis, trenching and back-filling and laying water pipes,	-	-	75 00
2296	Fales, Jenks & Sons, fire hydrants, stop valves, taps and stops, &c.,	-	-	10,369 72
2297	Fuller Iron Works, special castings and valve boxes,	-	-	1,324 77
	Amount carried forward,	-	-	\$37,036 73

REPORT OF THE WATER COMMISSIONERS.

17

	Amount brought forward,	-	-	\$57,036 73
2298	Union Water Meter Co., water meters and repairing,	-	-	549 42
2299	Dexter Gorton & Co., carpenter's work, lumber, &c.,	-	-	378 01
2300	Tuttle & Hobbs, horse-keeping, &c.,	-	-	251 37
2301	Lobdell & Newmans, labor and materials at Hope station,	-	-	749 62
2302	Hopkins & Pomroy, drain pipe, coal, cement, &c.,	-	-	123 89
2303	Charles E. Jencks, labor and materials at Hope station,	-	-	63 65
2304	L. H. Tillinghast & Co., nickel plated bibbs, &c.,	-	-	53 00
2305	Wood & Winsor, labor, pipe and fittings, &c.,	-	-	52 04
2306	George L. Clafin & Co., sundries,	-	-	21 27
2307	Olney Brothers, oil,	-	-	11 00
2308	Hopkins & Lyon, horse shoeing,	-	-	6 62
2309	Hopkins & Pomroy, teaming,	-	-	96 75
2310	Hammond, Angell & Co., printing,	-	-	194 69
2311	Samuel M. Gray, on account for paying laborers,	-	-	500 00
2312	W. A. Burdick, Agent, reservations in bills for granite,	-	-	550 00
2313	Paulding, Kemble & Co., on account for constructing pump ing engine,	-	-	850 00
2314	Lobdell & Newman, labor and materials at Hope station,	-	-	2,296 77
2315	William H. Miller & Co., blacksmith's work on tools, &c.,	-	-	80 75
2316	Barker, Whitaker & Co., tools, lead, &c.,	-	-	596 02
2317	Charles H. Pierce, salary as assistant engineer,	-	-	250 00
2318	Otis F. Clapp, " " " "	-	-	208 33
2319	Howard A. Carson, " " " "	-	-	250 00
2320	Charles H. Swan, " " " "	-	-	208 33
2321	William T. Schneider, " " " "	-	-	100 00
2322	John E. Bowen, " " " "	-	-	100 00
2323	Daniel D. Waterman, " " " "	-	-	83 33
2324	Leprillete Sweet, 2d, " " " "	-	-	83 33
2325	Edmund B. Weston, " " " "	-	-	83 33
2326	William M. Brown, Jr., " " " "	-	-	83 33
2327	Daniel C. Stone, " " " "	-	-	83 33
2328	Edwin P. Dawley, " " " "	-	-	83 33
2329	William F. Janes, " " service pipe " "	-	-	83 33
2330	Augustus F. Nagle, " " mechanical " "	-	-	200 00
2331	Frank B. Ferris, " " student, engineering de partment,	-	-	41 67
2332	Thomas L. Botts, salary as student, engineering department,	-	-	41 67
2333	William H. Olmstead, salary as student, " "	-	-	41 67
2334	George B. Francis, " " " "	-	-	33 33
2335	Charles A. Harper, salary as student, engineering depart- ment,	-	-	33 33
2336	Alfred E. Martin, salary as student, engineering department,	-	-	30 11
2337	Albert L. Bodwell, " " " "	-	-	33 33
2338	Walter F. Slade, " " service pipe clerk, engineering department,	-	-	83 33
2339	William Aplin, salary as clerk, engineering department,	-	-	83 33
2340	William H. Turner, " " " "	-	-	100 00
2341	Irvin H. Potter, " " " "	-	-	58 50
2342	Andrew B. Purdy, " " superintendent of pipe work,	-	-	166 67
	Amount carried forward,	-	-	\$67,108 51

	Amount carried forward,	-	-	-	\$67,108 51
2343	William H. Patterson, salary as inspector on pipe line,	-	-	-	104 00
2344	S. Horace Wheeler, " " of service pipes,	-	-	-	125 00
2345	Henry M. Wilcox, " " assistant inspector of service pipes,	-	-	-	100 00
2346	Frederic A. Arnold, salary as inspector of water fixtures,	-	-	-	100 00
2347	Albert C. Winsor, " " assistant inspector of water fixtures,	-	-	-	78 00
2348	Edward A. Moran, salary as inspector of meters,	-	-	-	100 00
2349	William Clancey, " " plumber, meter department,	-	-	-	42 50
2350	James H. Higgins, " " " " "	-	-	-	65 00
2351	John Lally, " " plumber's helper, meter department,	-	-	-	20 00
2352	Alexis C. Miller, salary as keeper of Hope Reservoir,	-	-	-	75 00
2353	Jeptha Baker, " " " " Sockanosset Reservoir,	-	-	-	75 00
2354	Albert E. Angell, " " temporary assistant, engineering department,	-	-	-	45 50
2355	George H. Slade, salary as temporary assistant, engineering department,	-	-	-	38 80
2356	Edward C. Reynolds, salary as temporary assistant, engineering department,	-	-	-	39 00
2357	George W. Winsor, Jr., salary as temporary assistant, engineering department,	-	-	-	37 50
2358	Henry G. Dennis, salary as superintendent of pipe yard,	-	-	-	125 00
2359	Richard M. Wood, " " clerk at pipe yard,	-	-	-	83 33
2360	John Outhbert, " " pumping engineer, Pettaconset,	-	-	-	104 17
2361	John Hamilton, " " " " "	-	-	-	85 00
2362	George F. Barney, " " fireman, Pettaconset,	-	-	-	60 00
2363	Patrick O'Rourke, " " " " "	-	-	-	70 00
2364	John Quinn, " " pumping engineer, Hope station,	-	-	-	125 00
2365	Joseph F. Plant, " " " " "	-	-	-	90 00
2366	Thomas Miller, " " fireman, Hope station,	-	-	-	65 00
2367	Michael Hamill, " " " " "	-	-	-	65 00
2368	Willism F. Tanner, " " axeman,	-	-	-	48 00
2369	Jesse W. Coleman, " " commissioners' clerk,	-	-	-	50 00
2370	Leonard N. Austin, Jr., salary as commissioners' clerk,	-	-	-	75 00
2371	Thomas C. Gushee, " " " " "	-	-	-	100 00
2372	Phillip S. Chase, " " " " "	-	-	-	180 00
2373	Clinton D. Sellew, " " secretary of water commissioners,	-	-	-	200 00
2374	John Purnell, salary as janitor, &c.,	-	-	-	55 93
2375	Charles H. Pierce, paid by him for sundries,	-	-	-	57 94
2376	Charles H. Pierce, paid by him for labor,	-	-	-	972 50
2377	Samuel M. Gray, engineering services, self and assistants,	-	-	-	499 55
2378	Samuel M. Gray, paid by him for sundries,	-	-	-	80 10
2379	Samuel M. Gray, " " " " labor,	-	-	-	92 09
2380	Clinton D. Sellew, " " " " sundries,	-	-	-	44 03
2381	Daniel F. Burlingame, repairing tools, &c.,	-	-	-	18 49
2382	Providence Steam and Gas Pipe Co., pipe and fittings,	-	-	-	23 07
2383	Mason, Chapin & Co., sulphur, muriatic acid, &c.,	-	-	-	30 76
	Amount carried forward,	-	-	-	\$71,523 77

	Amount brought forward,	-	-	\$71,523 77
2384	Preston & Spaulding, candles, soda, &c.,	-	-	7 14
2385	Builders Iron Foundry, fence posts, special castings, &c.,	-	-	1,438 62
2386	George W. Smith, cutting curbstones for hydrant boxes, &c.,	-	-	15 00
2387	John H. Eddy, brooms and pails,	-	-	5 10
2388	W. P. Knickerbocker & Co., rope,	-	-	19 50
2389	W. P. Knickerbocker & Co., rope,	-	-	57 00
2390	Abbott Lawrence, expressage on meters,	-	-	18 60
2391	J. W. Moore, paper strips,	-	-	11 13
2392	Edward T. Caswell, M. D., professional services, Simeon Noell, (charged to Paulding, Kemble & Co.,)	-	-	15 00
2393	Oliver Johnson & Co., red lead and white lead,	-	-	12 75
2394	W. E. Barrett & Co., lawn seed,	-	-	10 00
2395	Union Water Meter Co., meters and repairing meters,	-	-	631 00
2396	Samuel M. Gray, on account for paying laborers at Pettacomet,	-	-	500 00
2397	Lobdell & Newmans, on account of reservations in bills for constructing Hope Reservoir,	-	-	5,000 00
2398	Foster S. Dennis, trenching and back-filling and laying water pipes,	-	-	650 00
2399	Foster S. Dennis, carting pipes,	-	-	73 40
2400	Samuel M. Gray, on account for paying laborers at Pettacomet,	-	-	1,000 00
2401	Paulding, Kemble & Co., on account for constructing pump- ing engine,	-	-	584 61
2402	T. & W. Breck, rent of offices, &c.,	-	-	877 50
2403	Bugbee & Hall, stationery, &c.,	-	-	136 43
2404	Tucker, Swan & Co., coal, &c.,	-	-	525 99
2405	Samuel M. Gray, paid by him for labor at Pettacomet, &c.,	-	-	2,777 94
2406	James Glass, labor, &c., engine house at Pettacomet,	-	-	1,069 89
2407	R. S. Burrough & Co., oil,	-	-	51 23
2408	Fales, Jenks & Sons, water meters,	-	-	170 15
2409	Fuller Iron Works, special castings and valve boxes,	-	-	1,191 58
2410	William Elsbree, teaming,	-	-	60 02
2411	William H. Miller & Co., rods and nuts, repairing tools, &c.,	-	-	163 01
2412	Hopkins & Pomroy, coal, hair, pipe, teaming, &c.,	-	-	212 21
2413	Wood & Winsor, labor, pipe and fittings,	-	-	25 18
2414	William B. Blanding, apothecary's supplies, Simeon Noell, (charged to Paulding, Kemble & Co.,)	-	-	34 30
2415	Paulding, Kemble & Co., on account for constructing pumping engine,	-	-	500 00
2416	Yetter & Wack, sprinkling street,	-	-	10 00
2417	Dexter Gorton & Co., carpenter's work, lumber, &c.,	-	-	77 96
2418	J. Herbert Shedd, salary as chief engineer,	-	-	2,000 00
2419	Charles H. Pierce, " " assistant engineer,	-	-	250 00
2420	Otis F. Clapp, " " " " "	-	-	208 33
2421	Howard A. Carson, " " " " "	-	-	250 00
2422	Charles H. Swan, " " " " "	-	-	208 33
2423	William T. Schneider, " " " " "	-	-	100 00
2424	John E. Bowen, " " " " "	-	-	100 00
2425	Daniel D. Waterman, " " " " "	-	-	83 33
2426	Lepilete Sweet, 2d, " " " " "	-	-	83 33

Amount carried forward, . . . \$92,738 83

Amount brought forward,		\$92,738 83
2427	Edmund B. Weston, salary as assistant engineer,	83 33
2428	William M. Brown, Jr., " " " "	83 33
2429	Daniel C. Stone, " " " "	83 33
2430	Edwin P. Dawley, " " " "	83 33
2431	William F. Janes, " " service pipe engineer,	83 33
2432	Augustus F. Nagle, " " mechanical " "	150 00
2433	Frank B. Ferris, " " student, engineering department,	41 67
2434	Thomas L. Botts, " " " " " "	41 67
2435	William H. Olmstead, " " " " " "	41 67
2436	George B. Francis, " " " " " "	33 33
2437	Charles A. Harper, " " " " " "	33 33
2438	Albert L. Bodwell, " " " " " "	33 33
2439	Walter F. Slade, " " service pipe clerk, engineer's dep't,	83 33
2440	William Aplin, " " clerk, engineering department,	83 33
2441	William H. Turner, " " " " " "	100 00
2442	Irvin H. Potter, " " " " " "	59 62
2443	Andrew B. Purdy, " " superintendent of pipe work,	106 67
2444	William H. Patterson, " " inspector on pipe line,	104 00
2445	S. Horace Wheeler, " " " of service pipes,	125 00
2446	Henry M. Wilcox, " " assistant inspector of service pipes,	100 00
2447	Frederic A. Arnold, " " inspector of water fixtures,	190 00
2448	Albert C. Winsor, " " assistant inspector of water fixtures,	75 00
2449	Edward A. Moran, salary as inspector of water meters,	100 00
2450	William Clancey, " " plumber, meter department,	50 00
2451	James H. Higgins, " " " " " "	57 50
2452	John Lally, " " plumber's helper, " " " "	18 33
2453	George W. Mitchell, " " inspector at Hope Reservoir,	23 00
2454	Alexis C. Miller, " " keeper of Hope Reservoir,	77 50
2455	Jeptha Baker, " " " " Sockanosset Reservoir,	77 50
2456	Albert E. Angell, salary as temporary assistant, eng' dep't,	45 50
2457	George H. Slade, " " " " " "	42 40
2458	Edward C. Reynolds, " " " " " "	40 50
2459	Geo. W. Winsor, Jr., " " " " " "	37 50
2460	Everett H. Sweet, " " " " " "	19 50
2461	Henry G. Dennis, " " superintendent of pipe yard,	125 00
2462	Richard M. Wood, " " clerk at pipe yard,	83 33
2463	John Cuthbert, " " pumping engineer, Pettaconset,	104 17
2464	John Hamilton, " " " " " "	85 00
2465	George F. Barney, " " fireman, " "	60 00
2466	Patrick O'Rourke, " " " " " "	70 00
2467	John Quinn, " " pumping engineer, Hope station,	125 00
2468	Joseph F. Plant, " " " " " "	90 00
2469	Thomas Miller, " " fireman, " "	65 00
2470	Michael Hamill, " " " " " "	65 00
2471	William F. Tanner, " " axeman, " "	54 00
2472	Jesse W. Coleman, " " commissioners' clerk,	50 00
2473	Leonard N. Austin, Jr., salary as " " "	75 00
2474	Thomas C. Gushee, " " " " " "	100 00
2475	Philip S. Chase, " " " " " "	150 00

Amount carried forward,

\$96,418 16

	Amount brought forward,	\$96,418 16
2476	Clinton D. Sellow, salary as secretary of water commissioners,	200 00
2477	William Corliss, " " water commissioner,	500 00
2478	Chas. E. Carpenter, " " " "	500 00
2479	Joseph J. Cooke, " " " "	500 00
2480	John Purnell, " " janitor, &c.,	56 56
2481	Charles H. Pierce, paid by him for sundries,	197 47
2482	Charles H. Pierce, paid by him for labor,	1,220 40
2483	Samuel M. Gray, engineering services, self and assistants,	450 06
2484	John West, on account for services as consulting and super- tending engineer,	700 00
2485	Olney Brothers, oil,	11 16
2486	Wm. M. Bender & Co., sole tile,	526 15
2487	Thomas Phillips & Co., tin lined lead pipe, &c.,	694 06
2488	Thomas Phillips & Co., on account for labor and materials, engine house at Pettaconset,	1,000 00
2489	George W. Smith, cutting stone for hydrant boxes, &c.,	10 00
2490	Abbott Lawrence, expressage on meters,	16 90
2491	Union Water Meter Co., water meters, &c.,	480 50
		<hr/>
		\$103,481 42

RECEIVED FROM SEPTEMBER 1, 1875, TO NOVEMBER 30, 1875, IN-
CLUSIVE, AND PAID TO THE CITY TREASURER.

1875.

Sept. 10.	Of Daniel M. Lufkin, for one month's rent of farm in Warwick, purchased of Miss Patience W. Chace, to September 12, 1875,	\$14 58
16.	Of Fuller Iron Works, for scrap iron,	163 00
29.	Of Samuel M. Gray, for sundries,	8 05
	Of City of Providence, for sewer expenses,	4,201 83
Oct. 1.	Of Henry L. Johnson, for three months' rent of land in Pawtuxet, to October 1, 1875,	21 75
	Of heirs of Joseph Harris, for labor and materials,	32 58
4.	Of Peleg P. Cranston, for three months' rent of "Randall estate," so called, to October 1, 1875,	50 00
	Of Howard A. Carson, for services of student,	1 00
13.	Of Daniel M. Lufkin, for one month's rent of farm in Warwick, purchased of Miss Patience W. Chace, to October 12, 1875,	14 58
	Of Samuel M. Gray, for sundries,	5 29
27.	Of City of Providence, for sewer expenses,	225 7
	Of G. B. & W. F. Inman, for labor and materials,	5 5
30.	Of Henry G. Dennis, for cast iron water pipe,	6 1
Nov. 1.	Of B. G. Palmer, Jr., for drain tiles,	10 00
16.	Of Daniel M. Lufkin, for one month's rent of farm in Warwick, purchased of Miss Patience W. Chace, to November 12, 1875,	14 58
30.	For setting and repairing meters during the present quarter,	765 48
	For laying service pipes during the present quarter,	617 58
	For penalties during the present quarter,	12 00
	For meters during the present quarter,	2,530 00
	For water during the present quarter,	20,263 39
		<hr/> \$28,968 92

TRIAL BALANCE OF LEDGER, NOVEMBER 30, 1875.

Dr.

Hope reservoir, for land,	\$117,865 63
" " " sundries,	1,773 03
" " " labor,	6,692 63
" " " gate chambers,	11,561 63
" " " drain,	1,927 39
" " " inspection,	8,614 26
" " " conduit,	3,746 18
" " " slope wall,	43,127 81
" " " gate houses,	3,119 79
" " " steps,	3,103 01
" " " iron railing,	1,418 81
" " " improvement of grounds,	1,056 67
" " " fence,	656 91
Hope engine house,	105,186 69
Sockanosset reservoir, for construction,	177,870 72
" " " sundries,	124 45
" " " land,	14,435 36
" " " gate houses,	18,634 15
" " " drain,	2,658 99
" " " inspection,	6,819 18
" " " extra work and materials,	189 70
" " " gate chambers,	19,299 27
" " " improvement of grounds,	11,837 69
" " " steps,	3,235 94
Lincoln reservoir, for land,	2,946 54
Line of leading mains, for labor and materials,	19,950 30
" " " " extra trenching, &c.,	472 45
" " " " land and damages,	1,665 00
Force main line, for land and damages,	3,006 36
" " " " labor and materials,	6,299 35
" " " " extra trenching, &c.,	332 56
Office furniture, stoves, gas fixtures, &c.,	1,305 03
Rent of offices,	2,777 78
Books, stationery, &c.,	653 20
Fuel and lights,	219 12
Horse hire by commissioners,	19 00
Travelling expenses of commissioners,	161 92
Janitor of rooms,	465 91
Commissioners' salaries,	21,542 17
Secretary's salary,	2,655 54
Clerks' salaries,	3,986 53
Sundries,	401 37
Printing,	2,198 63
Amount carried forward,	\$636,014 65

Amount brought forward,	\$636,014 65
Advertising,	1,929 88
Fences,	2,075 38
Rent of wharves and pipe yards,	6,144 03
Stop valves,	72,988 18
Linking curved pipes,	232 75
Storehouse and work shop,	1,208 98
Tools,	11,201 84
Labor on pipes,	17,724 32
Cast iron water pipes,	1,333,318 40
Special castings,	103,391 22
Lumber,	1,576 30
Fire hydrants,	105,526 46
Sockanosset hill cross road,	3,855 38
Telegraph lines,	2,242 32
Dwelling houses at Pettaconset,	10,063 75
Culverts and bridge on line of force mains,	6,775 33
Culverts at Pettaconset,	3,557 92
Real estate in Warwick,	11,486 85
Water privileges, mill, and other real estate in Pawtuxet,	45,631 15
Pochasset bridge,	5,559 82
Wharf salaries,	10,749 47
Temporary engine house at Pettaconset,	9,815 33
Roads, slopes, &c., at Pettaconset,	12,042 96
Engine house at Pettaconset,	305,917 64
Natural filter basin,	41,518 35
Removing loam,	462 95
Iron screw piles,	3,766 46
Hydrant bolts,	1,940 78
Pipe bolts,	1,933 70
Photographs,	328 25
Hydrant heads,	7,443 00
Taps and stops,	18,584 64
Valve covers,	9,377 56
Service pipe,	49,278 35
Hydrant boxes,	29,201 67
Setting fire hydrants,	10,701 06
Check valves,	2,562 48
Valve boxes,	33,408 79
Air cocks, boxes, covers and setting,	527 02
Setting blow-offs,	331 49
Pettaconset pumping station, for land,	25,902 12
Lobdell & Newmans,	188,025 00
A. & W. Sprague Manufacturing Co.,	2,500 00
Samuel M. Gray,	1,000 00
Paulding, Kemble & Co.,	104,834 06
Thomas Phillips & Co.,	3,583 84
James Glass,	4,395 26
Providence Steam Engine Co.,	22,018 12
Amount carried forward,	\$3,284,655 25

Amount brought forward . . .	\$3,284,655 25
Rhode Island Locomotive Works, . . .	28,145 71
Foster S. Dennis, . . .	11,425 00
Architectural Iron Works, . . .	30,502 91
French & Mackenzie, . . .	1,800 00
Akron Sewer Pipe Association, . . .	54 00
Sewer department, salaries and office expenses, . . .	1,213 32
City Treasurer, . . .	232,405 89
City Treasurer, for water payments, . . .	426,105 21
Testing pipe iron, . . .	443 50
Iron drain pipes and gate, . . .	224 21
Carting pipes, . . .	40,181 04
Counsel fees, . . .	5,500 00
Inspection of pipes, . . .	10,582 23
Testing bolts and composition castings, . . .	34 25
Laying water pipes, . . .	390,419 62
Laying service pipes, . . .	31,741 27
Laying suction pipe, &c., . . .	85 00
Drainage pump and engine, . . .	5,110 72
Hydrants for street sprinklers, . . .	2,636 90
Inspection of pipe laying, . . .	32,741 13
Temporary boarding house at Pettaconset, . . .	1,429 73
Public drinking fountains and troughs, . . .	3,311 96
Warwick test pits, . . .	1,313 40
Engine house at Pettaconset, for drain, . . .	2,132 37
Water meters set, belonging to the city, . . .	1,258 72
Worthington pumping engine, . . .	35,522 33
Hope pumping engine, . . .	63,104 67
Cornish pumping engine, . . .	8,683 65
Keeper's house at Sockanosset reservoir, . . .	7,088 84
Pipe in river embankment at Pettaconset, . . .	4,067 82
Inspection of engine work, . . .	4,387 08
Alterations at Hope pumping station for second engine, . . .	734 63
Boilers for Cornish engine, . . .	7,066 99
Stand pipe at Pettaconset, . . .	75 08
Drain tiles, . . .	516 15
	<hr/> \$4,676,680 62

ENGINEERING DEPARTMENT:—

For Instruments, . . .	3,385 79
Tools, . . .	734 12
Furniture, stoves, gas fixtures, &c., . . .	2,886 42
Draughting, . . .	3,523 52
Labor, . . .	9,518 18
Horse and wagon account, . . .	2,748 42
Horse keeping, shoeing, &c., . . .	2,598 37
Horse hire, . . .	5,190 65
Rent of offices, . . .	6,887 42
Amounts carried forward, . . .	<hr/> \$37,472 89 \$4,676,680 62

Amounts brought forward,	\$37,472 89	\$4,676,680 63
Fuel and lights,	710 27	
Janitor of rooms,	1,271 54	
Experimental filter,	91 08	
Books, stationery, &c.,	3,502 84	
Sundries,	3,730 86	
Test wells,	1,579 40	
Consultations,	827 08	
Office building at Pettaconset,	567 60	
" " " Sockanosset reservoir,	563 22	
Stakes and strips,	1,313 71	
Printing,	656 25	
Maps,	129 42	
Service pipe experiments,	296 04	
Temporary assistance,	10,590 95	
Salaries,	127,387 48	
		<u>\$190,680 63</u>

MAINTENANCE:—

Hope pumping station, for coal and wood,	8,835 89	
" " " " engineers,	3,727 56	
" " " " firemen,	2,254 65	
" " " " lights,	1,570 42	
" " " " sundries,	656 02	
" " " " night and Sunday watch,	41 23	
" " " " labor on fuel,	4 56	
Pettaconset pumping station, for coal and wood,	27,815 50	
" " " " engineers,	7,068 35	
" " " " firemen,	6,257 03	
Pettaconset pumping station, for labor on fuel,	2,598 07	
" " " " sundries,	5,082 72	
" " " " night and Sunday watch,	2,822 33	
Sockanosset reservoir, for watch,	3,559 25	
" " " " sundries,	6,797 37	
Hope reservoir, for watch,	390 00	
Ascertaining and removing nuisances on Pawtuxet river,	479 46	
Worthington pumping engine,	7,678 89	
Hope pumping engine,	4 68	
Miller boilers at Pettaconset,	137 86	
Change of grades,	2,193 17	
Inspection of water fixtures,	5,184 79	
Repairs on pipe line,	8,855 70	
Meter testing room,	270 91	
Setting, inspection and repair of meters,	702 07	
Commissioners' salaries,	7,833 38	
Secretary's salary,	2,655 61	
Clerks' salaries,	6,096 69	
Rent of offices,	1,315 26	

Amounts carried forward, \$122,889 40 \$4,867,371 25

REPORT OF THE WATER COMMISSIONERS.

27

Amounts brought forward,	.	.	\$122,889 40	\$4,867,371 25
Fuel and lights,	.	.	58 73	
Janitor of rooms,	.	.	262 94	
Books, stationery, &c.,	.	.	646 86	
Printing,	.	.	676 48	
Advertising,	.	.	83 41	
Sundries,	.	.	343 59	
Counsel fees,	.	.	1,000 00	
Thawing pipes, gates, &c.,	.	.	1,264 82	
Supplying water takers, by reason of frost,	.	.	1,280 38	
Engineering department, for rent of offices,	.	.	2,736 52	
" " " fuel and lights,	.	.	135 15	
" " " janitor of rooms,	.	.	537 27	
" " " books, stationery, &c.,	.	.	184 67	
" " " printing,	.	.	166 07	
" " " salaries,	.	.	16,421 01	
" " " sundries,	.	.	15 34	148,702 64
				<hr/>
				\$5,016,073 89

CR.

Boston hydrants,	.	.	29 07	
Water meters,	.	.	1,326 35	
Penalties,	.	.	352 00	
Water,	.	.	428,105 21	
Approved bills,	.	.	4,588,261 26	
				<hr/>
				\$5,016,073 89

**SCHEDULE OF RECEIPTS FOR WATER, BY MONTHS, FROM
COMMENCEMENT TO NOVEMBER 30, 1875, INCLUSIVE.**

MONTHS.	1872	1873.	1874.	1875.
January.....		\$40,699 09	\$69,356 70	\$92,102 10
February.....	\$796 06	4,314 80	3,678 96	4,674 19
March.....	6,671 82	6,669 73	9,221 19	4,777 42
April.....	1,668 59	2,810 07	4,936 98	10,093 32
May.....	2,063 41	1,766 28	2,338 59	2,574 92
June.....	8,634 89	8,228 92	2,583 35	8,140 99
July.....	3,488 27	6,214 24	13,756 51	9,035 23
August.....	1,818 14	1,441 09	1,953 37	4,001 66
September.....	4,933 44	7,550 64	5,541 34	5,393 31
October.....	5,079 08	8,745 53	9,097 95	13,578 46
November.....	477 04	872 83	1,511 03	1,291 59
December.....	5,372 77	8,072 87	8,076 42	.....
	\$41,003 51	\$97,386 09	\$132,052 30	\$155,663 22

1876.

CITY DOCUMENT.

[No. 16.]

EIGHTH QUARTERLY REPORT

— OF THE BOARD OF

WATER COMMISSIONERS

OF THE

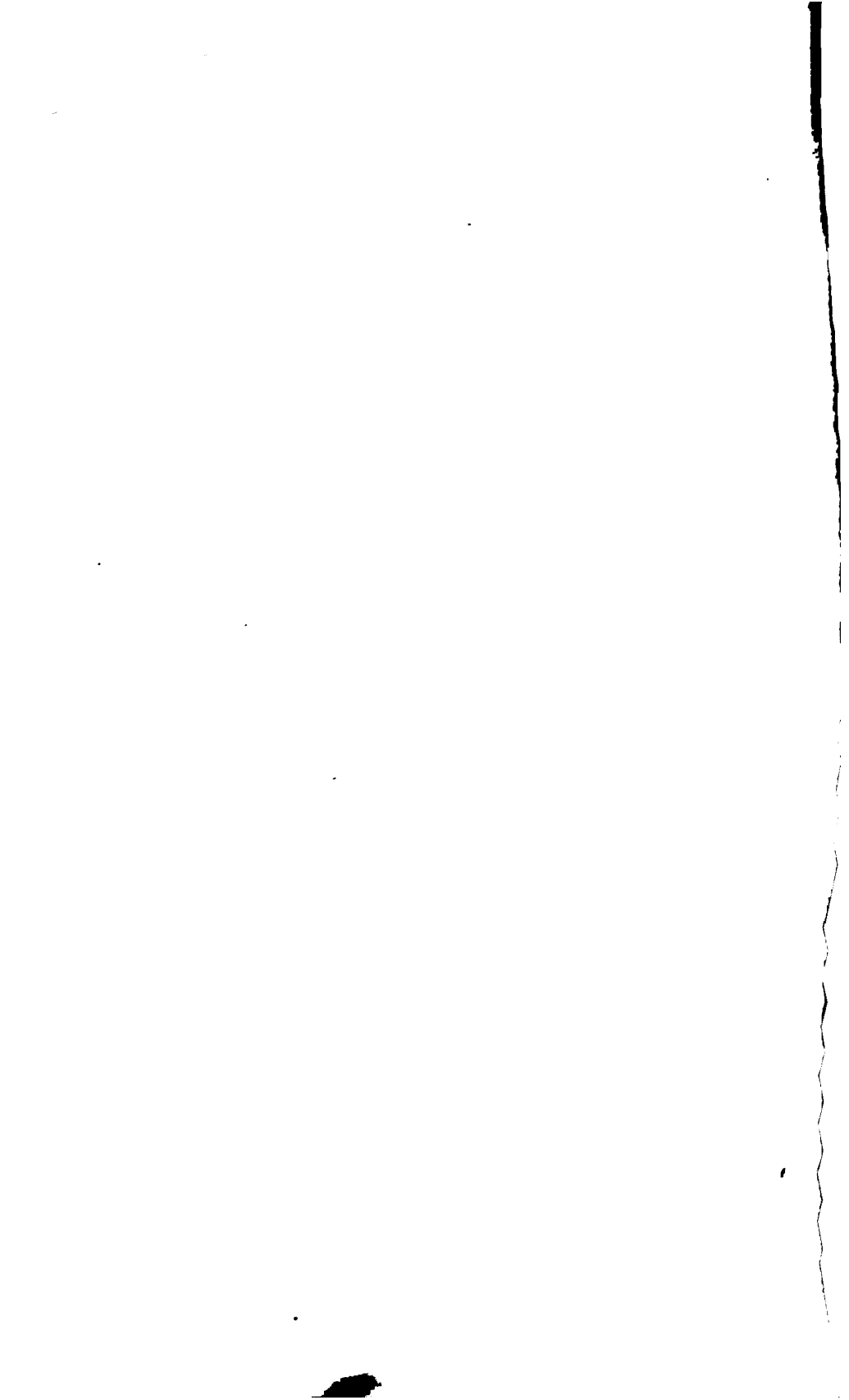
CITY OF PROVIDENCE.

[Elected February 27, 1874.]

MARCH 1, 1876.



PROVIDENCE:
PROVIDENCE PRESS COMPANY, PRINTERS TO THE CITY.
1876.



1876.]

CITY DOCUMENT.

[No. 16.]

EIGHTH QUARTERLY REPORT

OF THE BOARD OF

WATER COMMISSIONERS

OF THE

CITY OF PROVIDENCE.

[Elected February 27, 1874.]

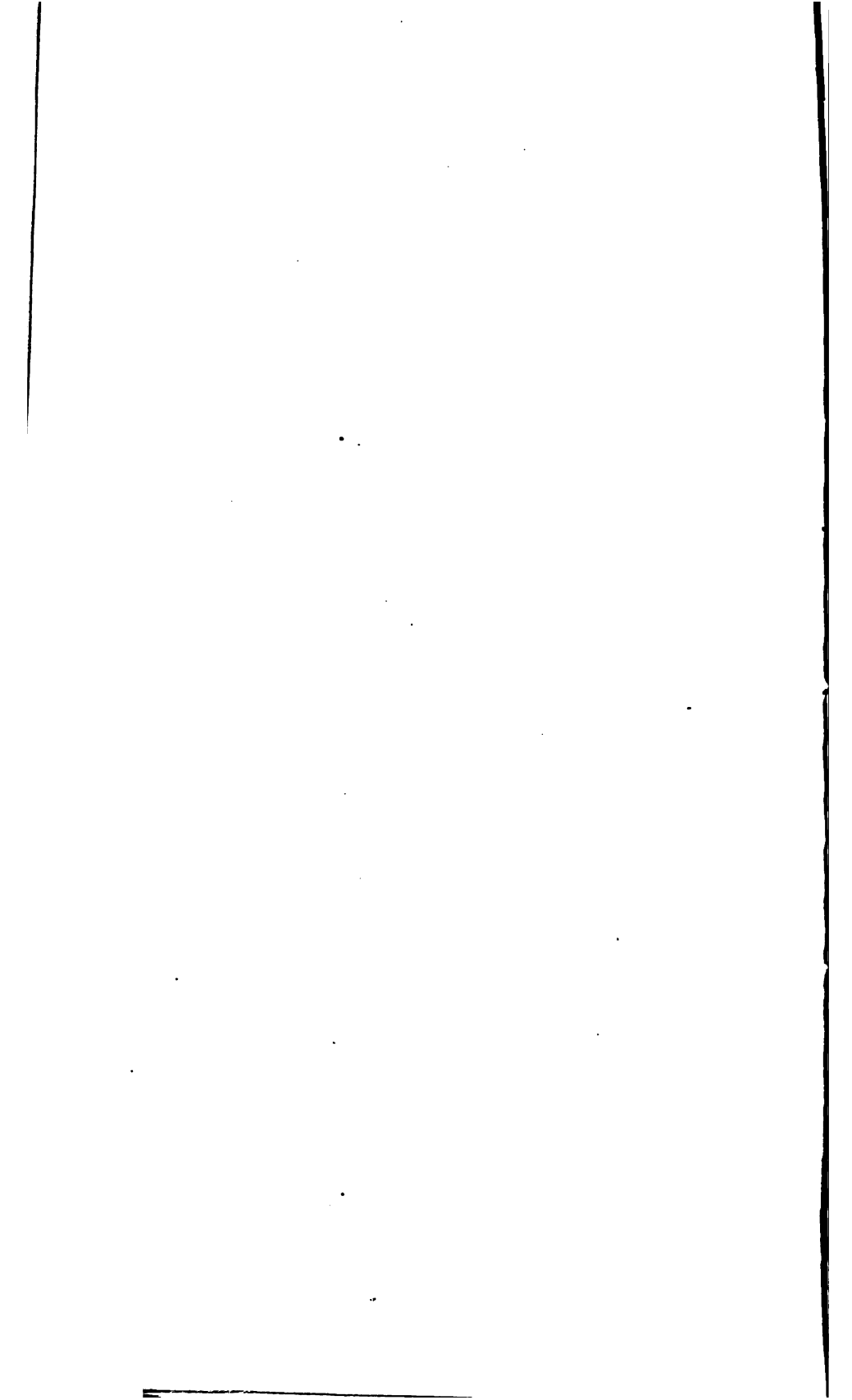
MARCH 1, 1876.



PROVIDENCE:

PROVIDENCE PRESS COMPANY, PRINTERS TO THE CITY.

1876.



ORGANIZATION
OF THE
PROVIDENCE WATER WORKS.

BOARD OF WATER COMMISSIONERS.

JOSEPH J. COOKE, PRESIDENT.

CHARLES E. CARPENTER,

WILLIAM CORLISS.

SECRETARY OF THE BOARD OF WATER COMMISSIONERS.

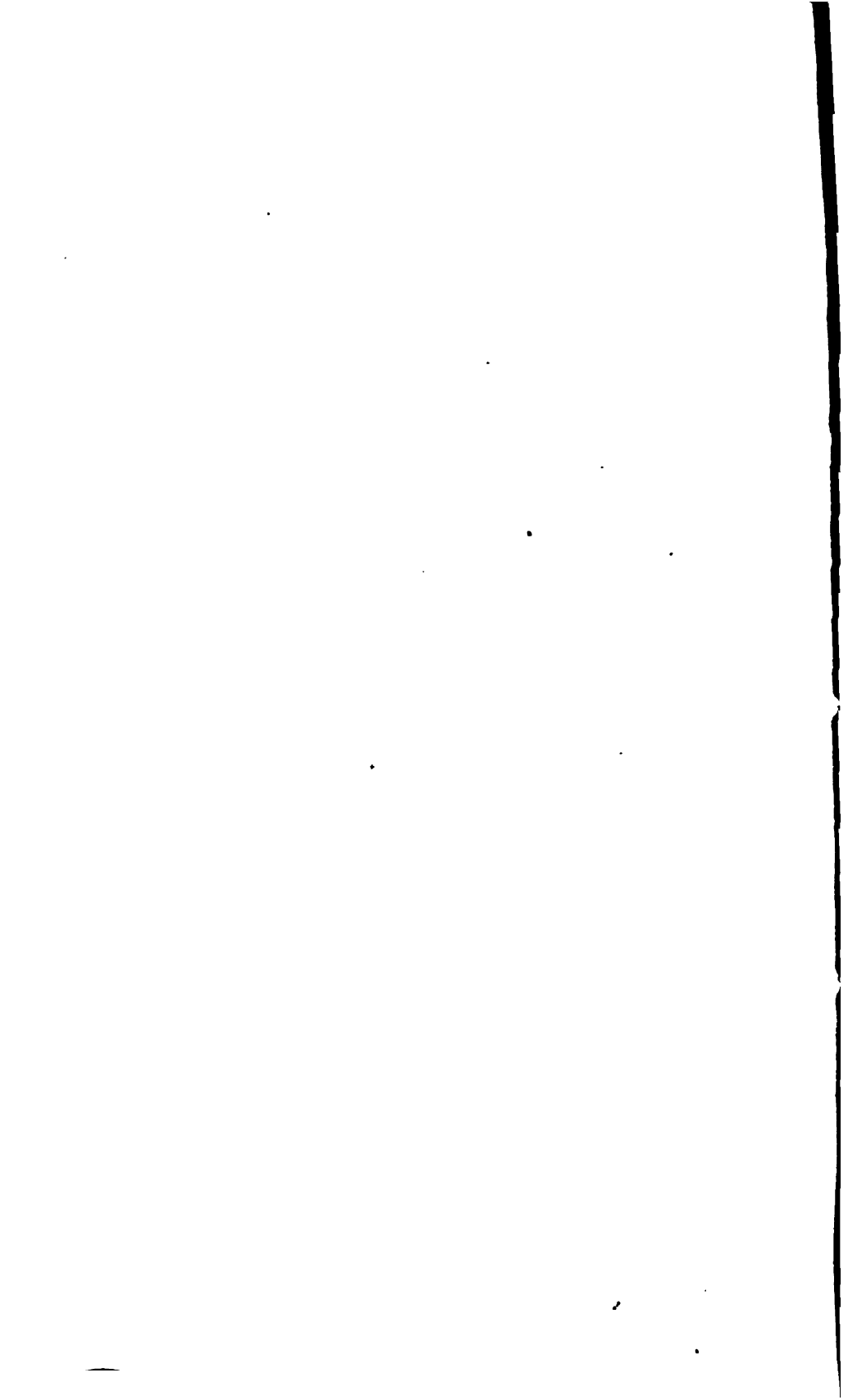
CLINTON D. SELLEW.

Office No. 35 North Main Street.

CHIEF ENGINEER.

J. HERBERT SHEDD.

Office No. 35 North Main Street.



REPORT.

OFFICE OF THE BOARD OF WATER COMMISSIONERS, }
PROVIDENCE, R. I., March 1st, 1876. }

TO THE HONORABLE THE CITY COUNCIL:—

The undersigned Water Commissioners, elected February 27, 1874, under "An Ordinance to establish a Board of Water Commissioners," approved same day, respectfully present their Eighth Quarterly Report.

An offer of Dexter Gorton & Co., to perform the labor and furnish the materials, for wood work on stairs around Stand-Pipe at Pettacouset, as per plans, for the sum of three hundred and fifteen dollars, (\$315.00), has been accepted.

The Chief Engineer has been authorized to order the following articles from Fales, Jenks & Sons :

50 six-inch water gates, at -	-	-	\$29 00 each.
50 fire hydrants, with improved valve, at -	-	-	110 00 each.
50 hydrant boxes, at -	-	-	27 00 each.
500 one-half inch taps, at -	-	-	1 15 each.
500 one-half inch stops, at -	-	-	83 each.

A copy of the preliminary report of the committee of experts, who tested the high-service pumping engine erected at Hope station by the Providence Steam Engine Company, was transmitted to the Council 3d January, and was printed

as City Document No. 5, of the present year. The detailed report has not yet been received. The engine is supplying the service economically and satisfactorily.

Steam has been made in the boilers connected with the Cornish Engine at Pettaconset. The engine has been moved by water under the Sockanosset head. It is expected that it will be moved by steam within a week.

The daily consumption of water including waste and leakage during the last quarter, was about 2,183,000 gallons.

The following statement shows the length of pipes laid during the last quarter; the sizes of the pipes; where laid; and the totals since the commencement of the work:

8 INCH.

In Square street,	-	-	-	-	231 feet.
Including 1 cut pipe and 2 branches.					
Previously,	-	-	-	-	74,359 feet.
Total,	-	-	-	-	74,590 feet.

6 INCH.

In Blackstone, Burnside, Daboll, Eddy and Pearl streets,	-	-	-	-	1,526 feet.
Including 7 cut pipes, 3 branches and 5 gates.					
Previously,	-	-	-	-	394,096 feet.
Total,	-	-	-	-	395,622 feet.
Total of all sizes during the last quarter,	-	-	-	-	1,757 feet.
or $\frac{332}{1000}$ of a mile.					
Previously including 10, 12, 16, 20, 24, 30 and 36 inch, of which none have been laid during the last quarter,	-	-	-	-	633,472 feet.
Total,	-	-	-	-	635,229 feet.
or $120 \frac{308}{1000}$ miles.					

REPORT OF THE WATER COMMISSIONERS. 7

Eleven fire hydrants have been set during the last quarter, one in each of the following locations:—

Broad street, east side, 110 feet north of Pine street.

“ “ “ “ 90 “ “ “ Myrtle street.

Courtland street, south-west corner of Dawson street.

Daboll “ south side, about half way between Public and Updike streets.

Dexter street, north-west corner of Division street.

“ “ west side, 118 feet south of Waterloo street.

Federal “ north-west corner of Cory street.

Friendship street, west side, 94 feet north of Summer street.

Linden street, north side, 200 feet west of Pine street.

Pearl street, south side, 150 feet west of Prairie avenue.

West Exchange street, north side, 133 feet east of Brayton avenue.

The total number of fire hydrants is now nine hundred and twelve.

The height of water in Sockanosset Reservoir at 7 o'clock this morning was 180.03. High water in the reservoir, is 180.50 (above high tide in Providence river.)

The height of water in Hope Reservoir at 7 o'clock this morning, was 162.23. High water in the reservoir is 162.50 (above high tide in Providence river.)

One hundred and sixteen Ball & Fitts' water meters, made by the Union Water Meter Co., and thirty-three water meters made by Fales, Jenks & Sons, have been put in at the expense of water takers since the date of the last report. Three two-inch water meters made by Fales, Jenks & Sons have been set at the expense of the city. A one-inch water meter made by Fales, Jenks & Sons has been substituted for a one and one-half inch Union water meter. Two two-inch water meters made by Fales, Jenks & Sons have been substituted for one one-inch water meter made by Fales, Jenks & Sons,

and one one and one-half inch Union water meter. **These** changes have been made at the expense of water takers. **The** use of four five-eighths-inch water meters made by the **Union** Water Meter Co., and one five-eighths-inch Worthington meter, has been discontinued, four of the parties now **pay** schedule rates, and one service stop has been closed.

There are now twenty-four hundred and three water meters in use, viz. :

KIND.	SIZES.							TOTALS
	$\frac{1}{8}$ inch.	$\frac{3}{8}$ inch.	1 inch.	1 $\frac{1}{2}$ inch.	2 inch.	3 inch.	4 inch.	
Ball & Fitts	1,412	225	82	43	9	1	1	1,773
Worthington.....	188	.....	.....	.....	.....	.....	1	189
Fales, Jenks & Sons.....	.....	436	20	.....	5	.....	.....	461
	1,580	661	102	43	14	1	2	2,403

The total number of applications for a supply of water, is sixty-eight hundred and forty-three.

The number of new service stops opened during the last quarter, is one hundred and forty; one of which is for fire purposes only.

The number of service stops opened to date, is fifty-nine hundred and thirty-six.

One hundred and four stops have been closed during the last quarter, for non-payment of bills, sixty-two of which have been re-opened on payment of bills and a penalty in each case of two dollars. Three stops previously closed for non-payment have been re-opened during the last quarter; in two cases the bills and penalty of two dollars each were paid, and the remaining one the bill and penalty of two dollars

had been previously paid. Seventy-two stops closed for non-payment remain unopened. One stop was closed during the last quarter to enable the owner to set a meter, and one to enable the owner to make repairs; there being no stop-cock on the premises, a charge of two dollars, in each case, was paid; both stops have been re-opened. The use of three stops has been discontinued, but the pipes remain in view of possible future use.

Water is now supplied for the following uses:—

3 armories; 10 bakeries; 36 banks; 103 bar rooms; 2 bath houses; 1 bath house—Turkish; 111 boarding houses; 10 bottling establishments; 28 building purposes; 1 burying ground; 1 car house; 2 carriage depositories; 3 chasers; 1 Christian Union; 31 churches; 1 city barn; 2 city bridges; 1 city building; 14 city drinking fountains; 26 city drinking troughs; 912 city fire hydrants; 5 city fire steamer stations; 9 city hose stations; 10 club rooms; 14 coal yards; 1 college; 1 colored shelter; 1 conservatory of music; 4 convents; 2 court houses; 1 decorator; 1 Dexter Asylum; 2393 dwellings of one family; 2443 dwellings of two families; 226 dwellings of three families; 282 dwellings of four families; 32 dwellings of five families; 57 dwellings of six families; 5 dwellings of seven families; 7 dwellings of eight families; 1 dwelling of nine families; 1 dwelling of twelve families; 1 dye house; 9 elevators; 1 engine turner; 5 engravers; 2 enamel works; 1 express carriage house; 54 fire supplies, private; 62 fountains, private; 1 fountain, public; 1 furrier; 3077 garden and street hydrants; 4 gas holders; 5 gold and silver platers; 6 gold and silver refiners; 2 grain elevators; 39 green houses; 21 halls; 1 home for aged women; 1 home for aged men; 2 hospitals; 18 hotels; 1 infirmary; 5 laundries; 3 libraries; 1 lithographer; 23 lodging houses; 2 lumber dealers; 1 mason. *Manufacturing establishments*,—2 belt and picker; 3 blank book; 2 bleacheries; 1 bologna sausage; 1 bonnet bleachery; 2 boot and shoe; 1 box; 1 braiding

works; 2 brass foundries; 2 breweries; 1 brush; 2 butt : 9 carriage; 2 cement pipe; 1 chain; 1 chemical; 6 cigar; 1 cigar box; 19 cloak and dress; 1 coffin; 9 confectionery; 1 corset; 3 colorers of jewelery; 8 cotton; 1 crocus; 3 die sinkers; 2 dye wood; 1 emery wheel; 1 enameler of jewelery; 1 eyelet; 3 file; 9 furniture; 1 gas; 1 gas burner; 4 gas fixtures; 1 geer; 3 hat; 5 harness; 1 horse shoe; 2 ice cream and soda water; 1 iron company; 1 iron fence; 10 iron foundries; 1 Japan switch; 1 jewelers cards; 95 jewelry; 4 lapidaries; 28 machinists; 1 mowing machines; 1 nail keg; 2 oil; 1 organ; 1 paper box; 1 paper collar; 3 paper cop tube; 1 pattern; 4 patent medicines; 1 pencil case; 4 picture frame; 1 paint works; 2 pump; 2 reed; 1 rubber goods; 1 rubber tubing; 4 sash and blind; 1 saw; 2 screw; 1 sheet iron; 1 shell comb; 2 shirt; 3 silverware; 6 soap; 1 spiral spring; 1 starch; 1 steam boiler; 2 steam engines; 1 stencil plate; 1 stove; 2 tanners; 2 thread; 1 tinware; 4 tool; 3 top roll; 6 woolen goods; 1 yeast. *Markets*,—47 fish; 109 meat; *Mills*,—2 drug and grain; 3 flour and grain; 1 paint; 10 planing. 1 nickle plater; 1 opera house; 2 orphan asylums; 9 organs; 5 oyster houses; 570 offices; 11 photographers; 10 printing establishments; 8 plaster and stucco workers; 12 plumbers; 12 provision curers and packers; 6 police stations; 7 railroads; 1 reading room; 42 restaurants; 1 roofer. *Saloons*,—4 billiard; 3 bowling; 6 ice cream; 26 lager beer; 11 oyster. *Schools*,—1 boarding; 14 private; 37 public; 1 Reform. *Shops*,—47 barber; 9 blacksmith; 1 carpenter; 3 cooper; 2 gunsmith; 1 junk; 17 paint; 6 shoemaker; 23 tailor; 5 tinman. *Stables*,—6 hack; 48 livery; 302 private; 5 sale; 72 work. 13 steamboats; 13 steamships; 6 steam and gas pipe fitters. *Stores*,—1 agricultural implements; 46 apothecary; 1 auction; 4 book; 33 boot and shoe; 2 carpet; 2 carriage trimmings; 10 cigar; 25 clothing; 14 confectionery; 3 drug; 40 dry goods; 81 fancy goods; 11 flour and grain; 11 fruit; 12 furniture; 12 gents' furnishing goods; 144 grocery,

REPORT OF THE WATER COMMISSIONERS. 11

retail; 15 grocery, wholesale; 11 hardware; 2 hide and leather; 2 hoop skirt; 11 house furnishing goods; 4 house paper; 3 iron and steel; 13 jewelry; 14 liquor; 1 lime and brick; 2 manufacturers' supplies; 33 millinery; 9 newspaper; 4 oil and paint; 2 paper and paper stock; 1 piano forte; 7 produce, wholesale; 3 sewing machine; 4 stationery; 2 stove; 5 tea; 2 trunk; 1 toy; 1 umbrella; 2 wooden ware; 1 wool; 2 woolen goods. 1 State prison; 1 store house; 6 stone cutters; 1 theatre; 4 undertakers; 1 United States Custom House building; 2 upholsterers; 2 water boats; 1 wheelwright; 1 wood turner; 3 wood yards; 28 not classed.

The amount of expenditures during the last quarter, is - - - - \$108,659 75
 The total amount of expenditures, is - 4,696,921 01
 The total amount of appropriations, is - 4,800,000 00
 The unexpended balance, is - - 103,078 99

The cost of construction to date (deducting from the whole amount of approved bills the cost of maintenance, the amounts received for labor and materials, &c.; meters; from sewer department for office expenses; estimated amount due from sewer department for engineering, &c.; and adding amount of reservation due to contractor, and amounts to the credit of Boston hydrants and water meters,) is - 4,253,236 30

The cost of maintenance to date, is - 161,560 14

The amount received during the last quarter, all of which has been paid to the City Treasurer, is

For water supplies, -	-	119,268 91
For water meters, -	-	4,061 00
For penalties, -	-	132 00
For sundries, -	-	45,413 50
	<hr/>	168,875 41

The amount received for water in 1872, was	41,003	51
The amount received for water in 1873, was	97,386	09
The amount received for water in 1874, was	132,052	39
The amount received for water in 1875, was	165,144	71
The amount received for water during two months of 1876, was	-	-
		109,787 42
The total amount received for water to date, is	545,374	12
The amount of all receipts to date, is	-	827,386 51

A schedule of bills approved during the last quarter, and of receipts during the same time, a trial balance of ledger, February 29th, 1876, and a schedule of receipts for water by months, are hercunto appended and made parts of this report.

A separate report of that portion of the duties of the Board which relates to sewers will be presented.

JOSEPH J. COOKE,	}	<i>Board of Water Commissioners.</i>
CHAS. E. CARPENTER,		

REPORT OF THE WATER COMMISSIONERS. 13

SCHEDULE OF BILLS APPROVED BY THE BOARD OF WATER COMMISSIONERS FROM DECEMBER 1, 1873, TO FEBRUARY 29, 1876, INCLUSIVE.

2492	Drs. Lawton & Stockman, professional services, Simeon Noell, (one-half charged to Paulding, Kemble & Co..)	\$980 00
2493	Foster S. Dennis, trenching, back-filling and laying water pipes,	750 00
2494	Hammond, Angell & Co., printing,	107 24
2495	New England Butt Co., castings for drinking fountains,	6 00
2496	American Screw Co., screws, (charged to Architectural Iron Works,)	7 38
2497	George Campbell, wire netting,	9 00
2498	Daniel F. Burlingame, repairing tools,	19 00
2499	Wood & Winsor, pipe and fittings,	54 24
2500	Dexter Gorton, & Co., lumber, carpenter's work, &c.,	58 83
2501	W. P. Knickerbocker & Co., rope,	3 94
2502	Foster S. Dennis, carting pipes,	107 67
2503	Freeborn & Crowell, labor, &c.,	115 60
2504	Barker, Whitaker & Co., tools, &c.,	120 93
2505	Hopkins & Pomroy, cement, coal, teaming, &c.,	132 47
2506	Fuller Iron Works, valve boxes and special castings,	793 28
2507	Thomas J. Hill, rent of wharf and pipe yard, &c.,	975 00
2508	Lobdell & Newmans, labor and materials,	2,382 43
2509	Samuel M. Gray, paid by him for labor,	2,742 40
2510	Bullders Iron Foundry, check valve, &c.,	1,142 28
2511	Mrs. Daniel F. Burlingame, services and expenses on account of accident to Simeon Noell, (one-half charged to Paulding, Kemble & Co.,)	384 84
2512	Samuel M. Gray, paid by him for sundries,	133 50
2513	Fales, Jenks & Sons, water meters,	235 75
2514	Charles H. Pierce, on account for paying laborers,	200 00
2515	Samuel M. Gray, " " " " "	1,000 00
2516	James Glass, on account for slating roof of engine house at Pettaconset,	100 00
2517	Paulding, Kemble & Co., on account for constructing pumping engine,	250 00
2518	Tucker, Swan & Co., coal,	2,146 32
2519	Clinton D. Sellow, paid by him for sundries,	86 44
2520	Samuel M. Gray, on account for paying laborers,	500 00
2521	Charles H. Pierce, salary as assistant engineer,	250 00
2522	Otis F. Clapp, " " " " "	208 83
2523	Howard A. Carson, " " " " "	250 00
2524	Charles H. Swan, " " " " "	208 33
2525	William T. Schneider, " " " " "	100 00
2526	John E. Bowen, " " " " "	100 00
2527	Daniel D. Waterman, " " " " "	83 33
2528	Lepriette Sweet, 2d, " " " " "	83 33
2529	Edmund B. Weston, " " " " "	83 33
2530	William M. Brown Jr., " " " " "	83 33
2531	Daniel C. Stone, " " " " "	83 33
2532	Edwin P. Dawley, " " " " "	83 33
2533	William F. Janes, " " service pipe engineer,	83 33
2534	Augustus F. Nagle, " " mechanical " "	100 00
2535	Frank B. Ferris, " " student, engineering department,	41 67
2536	Thomas L. Botts, " " " " "	41 67

Amount carried forward, - \$17,157 81

	Amount brought forward,	\$17,157 81
2537	William H. Olmstead, salary as student, engineering department,	41 67
2538	George B. Francis, " " " " "	33 33
2539	Charles A. Harper, " " " " "	33 33
2540	Albert L. Bodwell, " " " " "	33 33
2541	Alfred E. Martin, " " " " "	20 43
2542	Walter F. Slade, " " service pipe clerk, engineering department,	83 33
2543	William Aplin, salary as clerk, engineering department,	83 33
2544	William H. Turner, " " " " "	100 00
2545	Irvin H. Potter, " " " " "	62 10
2546	Andrew B. Purdy, " " superintendent of pipe work,	166 67
2547	William H. Patterson, " " inspector of pipe line,	52 00
2548	S Horace Wheeler, " " of service pipes,	125 00
2549	Henry M. Wilcox, " " assistant inspector of service pipes,	100 00
2550	Frederic A. Arnold, salary as inspector of water fixtures,	100 00
2551	Albert C. Winsor, " " assistant inspector of water fixtures,	81 00
2552	Edward A. Moran, salary as inspector of waters meters,	100 00
2553	William Clancey, " " plumber, meter department,	69 50
2554	James H. Higgins, " " " " "	62 50
2555	John C. Lally, " " plumber's helper, meter department,	15 83
2556	Alexis C. Miller, " " keeper of Hope reservoir,	75 00
2557	Jeptha Baker, " " " " Sockanosset reservoir,	75 00
2558	Albert E. Angell, " " temporary assistant, engineering department,	49 44
2559	George H. Slade, salary as temporary assistant, engineering department,	71 20
2560	Edward C. Reynolds, salary as temporary assistant, engineering department,	37 50
2561	George W. Winsor, Jr., salary as temporary assistant, engineering department,	37 50
2562	Everett H. Sweet, salary as temporary assistant, engineering department,	10 50
2563	Henry G. Dennis, salary as superintendent of pipe yard,	125 00
2564	Richard M. Wood, " " clerk at pipe yard,	83 33
2565	John Cuthbert, " " pumping engineer, Pettaconset,	104 17
2566	John Hamilton, " " " " "	85 00
2567	George F. Barney, " " fireman, " "	60 00
2568	Patrick O'Rourke, " " " " "	70 00
2569	John Quinn, " " pumping engineer, Hope station,	125 00
2570	Joseph F. Plant, " " " " "	90 00
2571	Thomas Miller, " " fireman, Hope station,	65 00
2572	Michael Hamill, " " " " "	65 00
2573	William F. Tanner, " " axman, .	51 00
2574	Jesse W. Coleman, " " commissioners' clerk, .	50 00
2575	Leonard N. Austin, Jr., " " " " "	75 00
2576	Thomas C. Gushee, " " " " "	100 00
2577	Philip S. Chase, " " " " "	150 00
2578	Clinton D. Seilew, " " secretary of water commissioners, .	200 00
2579	John Purnell, " " janitor, &c., .	57 57
2580	Charles H. Pierce, paid by him for sundries, .	58 37
2581	" " " " labor, .	883 10
2582	" " " on account for paying laborers, .	200 00

Amount carried forward, .

\$21,567 84

REPORT OF THE WATER COMMISSIONERS. 15

	Amount brought forward,	\$21,567 84
2583	Samuel M. Gray, engineering services, self and assistants,	507 78
2584	Abbott Lawrence, expressage on meters,	18 75
2585	William H. Miller & Co., plate iron, bolts and nuts,	176 37
2586	Henry L. Ripley, use of transit,	48 00
2587	Newport and Providence Lead Works, tin lined lead pipe,	1,440 00
2588	Union Water Meter Co., water meters and repairing,	1,099 50
2589	Hopkins & Lyon, horse shoeing,	7 00
2590	R. I. Hospital, board and attendance for Simeon Noell, (one-half charged to Paulding, Kemble & Co.,)	77 71
2591	John H. Appleton, analyses of water,	86 00
2592	John West, on account for services as consulting and superintending engineer,	500 00
2593	Rhode Island Locomotive Works, on account for furnishing boilers and stand pipe at Pettaconset. &c.,	2,000 00
2594	Channing Whitaker, services and expenses of assistants during trial of engine at Hope station,	625 75
2595	L. H. Humphrey, board of committee and assistants to test engine at Hope station,	578 36
2596	John A. Sweeney, board of assistants to test engine at Hope station,	70 18
2597	Hopkins & Sears, lodging of assistants to test engine at Hope station,	27 75
2598	Paulding, Kemble & Co., on account for constructing pumping engine,	1,800 00
2599	Providence Gas Company, gas,	267 72
2600	A. Walte, teaming,	16 50
2601	Knowles, Anthony & Danielson, advertising house at auction,	5 50
2602	Amos N. Beckwith, carting sand,	4 32
2603	Proprietors of Locks and Canals on Merrimack river, time and expenses of assistants to test engine at Hope station,	271 97
2604	E. P. Springer, labor at Hope station,	10 80
2605	R. S. Burrough & Co., oil,	95 95
2606	N. Webber, rubber boots,	33 00
2607	Potter, Denison & Co., stool and repairing,	4 92
2608	G. H. Copeland & Co., conveying Simeon Noell to Hospital, (one-half charged to Paulding, Kemble & Co.,)	5 00
2609	Belcher Brothers, combination locks, meter department,	4 80
2610	George Campbell, wire netting,	9 75
2611	Daniel F. Burlingame, repairing tools,	4 75
2612	Hopkins & Pomroy, coal, teaming, &c.,	162 28
2613	Freeborn & Crowell, painting roof of engine house at Pettaconset,	400 73
2614	James Crawford, painting signs and drinking fountains,	9 50
2615	Olney Brothers, oil,	8 41
2616	Fales, Jenks & Sons, water meters,	311 35
2617	Foster S. Dennis, carting pipes,	10 37
2618	Hammond, Angell & Co., printing,	106 11
2619	Tucker, Swan & Co., coal,	891 03
2620	Dexter Gorton & Co., lumber, carpenter's work, &c.,	220 57
2621	Tuttle & Hobbs, horse keeping, &c.,	261 72
2622	Foster S. Dennis, trenching and back-filling and laying water pipes,	1,811 16
2623	G. M. Hopkins & Co., atlas of Providence, volumes 2 and 3, two copies,	48 00
2624	French, Mackenzie & Co., wooden covering on stand pipe,	675 00
	Amount carried forward,	\$38,119 83

	Amount brought forward,		\$38,119 83
2625	Earl Carpenter & Sons, ice,		60 12
2626	Samuel B. Pearce, fence on south side of Hope reservoir,		447 09
2627	Henry Holden, horse shoeing,		7 00
2628	J. B. Handy, repairing wagon,		21 27
2629	G. W. Edmunds, repairing wagon,		25 39
2630	Samuel M. Gray, paid by him for sundries,		122 36
2631	French, Mackenzie & Co., on account for carpenter's work on engine house at Pettaconset,	1,350 00	
2632	Fuller Iron Works, valve boxes and special castings,	530 24	
2633	Willard F. Inman, carting pipes,	67 12	
2634	Samuel M. Gray, paid by him for labor,	1,591 18	
2635	William H. Miller & Co., repairing tools, &c.,	58 58	
2636	Oliver Johnson & Co., white lead, red lead, putty and glass,	37 04	
2637	Samuel M. Gray, on account for paying laborers,	500 00	
2638	Hopkins & Sears, meals for clerks while collecting water rates,	28 80	
2639	Hopkins & Sears, meals, &c., for committee and assistants to test engine at Hope station,	1,700 00	
2640	Peleg P. Cranston, fencing mill cellar at Pawtuxet,	10 75	
2641	Providence Steam Engine Co., on account for constructing pumping engine,	25,000 00	
2642	Paulding, Kemble & Co., on account for constructing pumping engine,	1,000 00	
2643	Charles H. Pierce, salary as assistant engineer,	250 00	
2644	Otis F. Clapp, " " " "	206 33	
2645	Howard A. Carson, " " " "	250 00	
2646	Charles H. Swan, " " " "	208 33	
2647	William T. Schneider, " " " "	100 00	
2648	John E. Bowen, " " " "	100 00	
2649	Daniel D. Waterman, " " " "	83 33	
2650	Leprilte Sweet, 2d, " " " "	83 33	
2651	Edmund B. Weston, " " " "	83 33	
2652	William M. Brown, Jr., " " " "	88 33	
2653	Daniel C. Stone, " " " "	83 33	
2654	Edwin P. Dawley, " " " "	88 33	
2655	William F. Janes, " " service pipe engineer,	88 33	
2656	Augustus F. Nagle, " " mechanical " "	200 00	
2657	Frank B. Ferris, " " student, engineering department,	41 67	
2658	Thomas L. Botts, " " " " " "	41 67	
2659	William H. Olmsted, " " " " " "	41 67	
2660	George B. Francis, " " " " " "	33 33	
2661	Charles A. Harper, " " " " " "	33 33	
2662	Alfred E. Martin, " " " " " "	33 33	
2663	Albert L. Bodwell, " " " " " "	33 33	
2664	Walter F. Slade, salary as service pipe clerk, " "	83 33	
2665	William Aplin, salary as clerk, " "	83 33	
2666	William H. Turner, " " " " " "	100 00	
2667	Irvin H. Potter, " " " " " "	73 97	
2668	Andrew B. Purdy, " " superintendent of pipe work,	166 67	
2669	S. Horace Wheeler, " " inspector of service pipes,	125 00	
2670	Henry M. Wilcox, " " assistant inspector of service pipes,	100 00	
2671	Frederic A. Arnold, " " inspector of water fixtures,	100 00	
2672	Albert C. Winsor, " " assistant inspector of water fixtures,	78 00	
2673	Edward A. Moran, " " inspector of meters,	10 00	
2674	William Clancey, " " plumber, meter department,	67 50	
2675	James H. Higgins, " " " " " "	67 50	
	Amount carried forward,		\$71,981 07

REPORT OF THE WATER COMMISSIONERS. 17

	Amount brought forward,	\$71,981 07
2676	John C. Lally, salary as plumber's helper, meter department,	22 50
2677	Alexis C. Miller, " " keeper of Hope reservoir,	77 50
2678	Jeptha Baker, " " keeper of Sockanosset reservoir,	77 50
2679	Albert E. Angell " " temporary assistant, &c, engineering department,	56 87
2680	George H. Slade, salary as temporary assistant, &c, engineering department,	78 40
2681	Edward C. Reynolds, salary as temporary assistant, &c., engineering department,	30 00
2682	George W. Winsor, Jr., salary as temporary assistant, &c., engineering department,	46 87
2683	Henry G. Dennis, salary as superintendent of pipe yard,	125 00
2684	Richard M. Wood, " " clerk at pipe yard,	83 33
2685	John Cuthbert, " " pumping engineer, Pettaconset,	104 17
2686	John Hamilton, " " " " "	85 00
2687	George F. Barney, " " fireman, Pettaconset,	60 00
2688	Patrick O'Rourke, " " " " "	70 00
2689	John Quinn, " " pumping engineer, Hope station,	125 00
2690	Joseph F. Plant, " " " " "	90 00
2691	Thomas Miller, " " fireman, Hope station,	65 00
2692	Michael Hamill, " " " " "	65 00
2693	William F. Tanner, " " axeman,	54 00
2694	Jesse W. Coleman, " " commissioners' clerk,	50 00
2695	Leonard N. Austin, Jr., " " " " "	75 00
2696	Thomas C. Gushee, " " " " "	100 00
2697	Phillip S. Chase, " " " " "	150 00
2698	Clinton D. Sellow, " " secretary of water commissioners,	200 00
2699	John Purnell, " " janitor, &c.,	55 81
2700	Charles H. Pierce, paid by him for sundries,	43 44
2701	Charles H. Pierce, " " " " labor,	860 28
2702	Samuel M. Gray, " " " " sundries,	98 95
2703	Clinton D. Sellow, " " " " "	32 11
2704	Akerman & Co., blank books, &c.,	31 26
2705	W. S. Fifield, brooms, &c.,	21 35
2706	Preston & Spaulding, candles, matches, soap, &c.,	10 76
2707	Abbott Lawrence, expressage on meters,	42 05
2708	Henry T. Root, brushes, feather duster, &c.,	10 25
2709	William H. Knight, charcoal,	24 57
2710	B. F. Almy, cop waste,	12 00
2711	Builders' Iron Foundry, clamps and castings,	118 28
2712	Henry Staples & Co, manilla paper,	5 50
2713	L. H. Thillinghast & Co., solder, &c.,	55 56
2714	Union Water Meter Co., water meters and repairing,	1,227 50
2715	Samuel M. Gray, engineering services, self and assistants,	535 90
2716	Paulding, Kimble & Co., on account for constructing pumping engine,	750 00
2717	H. W. Clapp, sewer caps,	16 00
2718	Thomas J. Hill, rent of wharf and pipe yard,	875 00
2719	William Elsbree, teaming,	20 00
2720	Samuel M. Gray, on account for paying laborers,	300 00
2721	Samuel M. Gray, paid by him for labor,	1,438 71
2722	Samuel M. Gray, " " " " "	99 97
2723	Dexter Gorton & Co., carpenter's work, lumber, &c.,	498 09
2724	Hammond, Angell & Co., printing,	50 53
	Amount carried forward,	\$81,095 08

	Amount carried forward.		\$81,096 08
2725	Thomas Pray, Jr., pumps.		813 50
2726	Barker, Whitaker & Co., pig lead, tools, &c.,		243 55
2727	William H. Miller & Co., repairing tools, &c.,		13 95
2728	James H. Munroe, inspection of boiler at Pettaconset,		10 00
2729	F. Olds, adjusting and sealing scales, balances, &c.,		9 50
2730	Valpey, Angell & Co., stationery,		8 00
2731	B. F. Almy, cop waste,		12 00
2732	Hopkins & Pomroy, coal, cement, lime, carting bricks, &c.,		213 65
2733	Thomas B. Rose, cement,		13 13
2734	M. H. Sullivan, leather bag and straps,		6 75
2735	A. Waite, tanning.		4 87
2736	Fales, Jenks & Sons, water meters,		216 90
2737	Charles F. Pope, powder, fuse, &c.,		35 00
2738	Fales, Jenks & Sons, fire hydrants, hydrant boxes, water gates, taps and stops, &c.,		6,553 86
2739	Lobdell & Newmans, extra labor and materials, three months.		3,587 07
2740	F. H. Evans, expansion bolts, &c.,		91 69
2741	T. & W. Breck, rent of offices, &c.,		877 50
2742	Gideon G. Hicks, old boilers, boiler iron, &c.,		338 78
2743	N. D. Thurber, blacksmith's work at Hope pumping station,		15 35
2744	F. W. Bacon, use of indicators and appendages,		30 00
2745	Olney Brothers, oil,		11 52
2746	James Keeley, labor, &c., putting up shelves in engineer's office,		7 50
2747	Louis W. Clark, labor on telegraph lines, &c.,		34 33
2748	Henry C. Church, stationery, (test of Hope engine No. 2),		15 05
2749	James H. Harlow, calculations for test of Hope engine No. 2,		119 50
2750	E. F. Kimball, calculations for test of Hope engine No. 2,		179 56
2751	Tucker, Swan & Co., coal,		1,011 25
2752	Thomas Phillips & Co., tin-lined lead pipe,		175 25
2753	Thomas Phillips & Co., on account for labor and materials furnished,		700 00
2754	William H. Fenner & Co., pig tin, second hand furnaces, &c.,		313 18
2755	Bugbee & Hall, stationery,		163 55
2756	J. Herbert Shedd, salary as chief engineer,		2,000 00
2757	Charles H. Pierce, " " assistant "		250 00
2758	Otis F. Clapp, " " " "		208 33
2759	Howard A. Carson, " " " "		250 00
2760	Charles H. Swan, " " " "		208 33
2761	William T. Schneider, " " " "		100 00
2762	John E. Bowen, " " " "		100 00
2763	Daniel D. Waterman, " " " "		83 33
2764	Lepriele Sweet, 2d, " " " "		83 33
2765	Edmund B. Weston, " " " "		83 33
2766	William M. Brown, Jr., " " " "		83 33
2767	Daniel C. Stone, " " " "		83 33
2768	Edwin P. Dawley, " " " "		83 33
2769	William F. Jones, " " service pipe engineer,		83 33
2770	Augustus F. Nagle, " " mechanical "		100 00
2771	Frank B. Ferris, " " student, engineering department.		41 67
2772	Thomas L. Botts, " " " "		41 67
2773	William H. Olmsted, " " " "		41 67
2774	George B. Francis, " " " "		33 33
2775	Charles A. Harper, " " " "		33 33
2776	Alfred E. Martin, " " " "		33 33
2777	Albert L. Bodwell, " " " "		33 33

Amount carried forward, .

\$101,028 14

REPORT OF THE WATER COMMISSIONERS. 19

	Amount brought forward,	\$101,028 14
2778	Walter F. Slade, salary as service pipe clerk, engineering department,	83 33
2779	William Aplin, salary as clerk, engineering department,	83 33
2780	William H. Turner, " " " " "	100 00
2781	Irvin H. Potter, " " " " "	50 25
2782	Andrew B. Purly, salary as superintendent of pipe work,	166 67
2783	S. Horace Wheeler, " " inspector of service pipes,	125 00
2784	Henry M. Wilcox, " " assistant inspector of service pipes,	100 00
2785	Frederic A. Arnold, " " inspector of water fixtures,	100 00
2786	Albert C. Winsor, " " assistant inspector of water fixtures,	75 00
2787	Edward A. Moran, " " inspector of water meters,	100 00
2788	William Cluncey, " " plumber, meter department,	53 75
2789	James H. Higgins, " " " " "	62 50
2790	John C. Lally, " " plumber's helper meter department,	18 33
2791	Alexis C. Miller, " " keeper of Hope reservoir,	72 50
2792	Jeptha Baker, " " " " Sockanoset reservoir,	72 50
2793	Albert E. Angell, " " temporary assistant, engineering department,	43 75
2794	George H. Slade, salary as temporary assistant, engineering department,	42 40
2795	Edward C. Reynolds, salary as temporary assistant, engineering department,	37 50
2796	George W. Winsor, Jr., salary as temporary assistant, engineering department,	36 00
2797	Henry G. Dennis, salary as superintendent of pipe yard,	125 00
2798	Richard M. Wood, " " clerk of pipe yard,	83 33
2799	John Cuthbert, " " pumping engineer, Pettaconset,	104 17
2800	John Hamilton, " " " " "	85 00
2801	George F. Farney, " " fireman, Pettaconset,	60 00
2802	Patrick O'Rourke, " " " " "	70 00
2803	John Quinn, " " pumping engineer, Hope station, (engaged upon repairs of Corliss engine,)	125 00
2804	Marcus E. Sherman, salary as pumping engineer, Hope station,	100 00
2805	Thomas Miller, " " fireman, Hope station,	65 00
2806	Judson Davis, " " " " "	65 00
2807	Joseph F. Plant, " " pumping engineer, Hope station, (engaged upon repairs of Corliss Engine,)	90 00
2808	Michael Humill, salary as fireman, Hope station, (engaged upon repairs of Corliss engine,)	65 00
2809	William E. Tanner, salary as axman,	50 00
2810	Jesse W. Coleman, " " commissioners' clerk,	50 00
2811	Leonard N. Austin, Jr., " " " " "	75 00
2812	Thomas C. Gushee, " " " " "	100 00
2813	Phillip S. Chase, " " " " "	150 00
2814	Clinton D. Sellow, " " secretary of water commissioners,	200 00
2815	William Corliss, " " water commissioner,	500 00
2816	Charles E. Carpenter, " " " " "	500 00
2817	Joseph J. Cooke, " " " " "	500 00
2818	John Purnell, " " janitor, &c.,	51 05
2819	Charles H. Pierce, paid by him for sundries,	147 83
2820	" " " " " " labor,	523 53
2821	Samuel M. Gray, engineering services, self and assistants,	179 57
2822	Fuller Iron Works, repairing boiler of hoisting engine,	10 00
2823	Abbott Lawrence, expressage on meters,	20 75
	Amount carried forward,	\$106,553 18

	Amount brought forward,	\$106,555 18
2824	Union Water Meter Co., water meters and repairs,	857 90
2825	Freeborn & Crowell, labor, paint, oil, glass &c.,	804 67
2826	Robert Morrow, horse hire by engineers,	42 00
2827	John West, on account for services as consulting and superintending engineer,	400 00
		<hr/>
		\$108,659 75

REPORT OF THE WATER COMMISSIONERS. 21

RECEIVED FROM DECEMBER 1, 1875. TO FEBRUARY 29, 1876, INCLUSIVE,
AND PAID TO THE CITY TREASURER.

1875.		
Dec.	8. Of Fuller Iron Works, for scrap iron,	\$87 80
	14. Of John Smurthurst, for three months' rent of farm in War- wick, purchased of Richard U. Rhodes and wife, to March 1, 1876.	56 25
	15. Of City of Providence, for sewer expenses.	1,393 94
	Of City of Providence, for hydrant head delivered High- way Department,	25 00
	Of J. Lippitt Snow, for drain tile,	1 50
	21. Of Daniel M. Lufkin, for one month's rent of farm in War- wick, purchased of Miss Patience W. Chace, to Decem- ber 12, 1875,	14 58
	Of Alfred Mundell, for grated inlet,	7 63
	28. Of City of Providence, for sewer expenses,	4,627 00
1876.		
Jan.	1. Of Henry L. Johnson, for three months' rent of land in Pawtuxet, to January 1, 1876,	21 75
	10. Of Phineas A. Conley, for grass and pasturage on Gardiner farm,	100 00
	Of Samuel M. Gray, for sundries,	46 74
	22. Of Daniel M. Lufkin, for one month's rent of farm in War- wick, purchased of Miss Patience W. Chace, to January 12, 1876,	14 58
	Of Dewing & Monsell, for dockage,	15 00
	Of Rice, Draper & Co., for wharfage,	3 00
	Of Hiram S. Read, for drain tile,	9 10
	27. Of Ellery Millard, for loam,	35 00
	29. Of Wenscott Reservoir Co., on account for cast iron water pipe,	100 00
Feb.	5. Of Atlantic DeLaine Co., for labor and materials,	53 95
	7. Of Peleg P. Cranston, for three months' rent of "Randall estate," so called, to January 1, 1876,	50 00
	16. Of Daniel M. Lufkin, for one month's rent of farm in War- wick purchased of Miss Patience W. Chace, to February 12, 1876,	14 58
	26. Of City of Providence, for sewer expenses,	37,287 72
	Of H. A. Carson, for leveling rod,	1 75
	28. Of Union Railroad Co., for six months' rent of land in Pawtuxet, to February 23, 1876,	12 50
	29. Of Wenscott Reservoir Co., on account for cast iron water pipe,	75 00
	For setting and repairing meters during the present quarter,	896 09
	For laying service pipes during the present quarter,	463 04
	For penalties during the present quarter,	132 00
	For water meters during the present quarter,	4,061 00
	For water during the present quarter,	119,268 91
		<hr/> \$168,875 41

TRIAL BALANCE OF LEDGER, FEBRUARY 29, 1876.

DR.

Hope reservoir, for land,	.	.	\$117,923 88
" " sundries,	.	.	1,813 60
" " labor,	.	.	6,828 65
" " gate chambers,	.	.	11,567 48
" " gate houses,	.	.	3,221 00
" " drain,	.	.	1,947 31
" " inspection,	.	.	8,014 26
" " conduit,	.	.	3,746 18
" " slope wall,	.	.	43,127 81
" " steps,	.	.	3,103 33
" " iron railing,	.	.	1,418 81
" " fence,	.	.	1,482 18
" " improvement of grounds,	.	.	5,418 23
Hope engine house,	.	.	105,462 20
Sockanosset reservoir, for construction,	.	.	177,870 72
" " sundries,	.	.	124 45
" " land,	.	.	14,305 36
" " gate houses,	.	.	18,041 95
" " drain,	.	.	3,506 01
" " inspection,	.	.	6,819 18
" " extra work and materials,	.	.	189 70
" " gate chambers,	.	.	19,299 27
" " improvement of grounds,	.	.	13,613 13
" " steps,	.	.	3,235 94
Lincoln reservoir, for land,	.	.	2,946 54
Line of leading mains, for labor and materials,	.	.	19,930 30
" " " " extra trenching, etc.,	.	.	472 45
" " " " land and damages,	.	.	1,665 00
Force main line, for land and damages,	.	.	3,006 35
" " " " labor and materials,	.	.	6,505 29
" " " " extra trenching, etc.,	.	.	332 56
Office furniture, stoves, gas fixtures, etc.,	.	.	1,300 95
Rent of offices,	.	.	2,875 00
Books, stationery, etc.,	.	.	667 59
Fuel and lights,	.	.	225 10
Horse hire by commissioners,	.	.	19 00
Traveling expenses of commissioners,	.	.	701 92
Janitor of rooms,	.	.	484 51
Commissioners' salaries,	.	.	22,042 15
Secretary's salary,	.	.	2,855 52
Clerks' salaries,	.	.	4,136 53
Sundries,	.	.	502 49
Printing,	.	.	2,275 40
Advertising,	.	.	1,935 33
Fences,	.	.	2,075 38
Rent of wharves and pipe yards,	.	.	7,192 78
Stop valves,	.	.	74,504 18
Amount carried forward,	.	.	\$731,325 08

REPORT OF THE WATER COMMISSIONERS. 23

Amount brought forward,	\$731,325 08
Linking curved pipes,	232 75
Store house and work shop,	1,209 64
Tools,	11,321 84
Labor on pipes,	15,963 80
Cast iron water pipes,	1,332,967 10
Special castings,	103,638 79
Lumber,	1,576 30
Fire hydrants,	107,510 46
Sockanosset hill cross-road,	8,855 38
Telegraph lines,	2,262 17
Dwelling houses at Pettaconset,	10,080 63
Culverts and bridge on line of force mains,	6,775 33
Culverts at Pettaconset,	3,557 93
Real estate in Warwick,	11,336 66
Water privileges, mill, and other real estate in Pawtuxet,	45,557 65
Pettaconset pumping station, for land,	25,902 41
Pochasset bridge,	5,559 89
Wharf salaries,	11,024 48
Temporary engine house at Pettaconset,	9,824 87
Roads, slopes, etc., at Pettaconset,	12,035 30
Engine house at Pettaconset,	310,570 51
Natural filter basin,	41,518 35
Removing loam,	402 95
Iron screw piles,	3,766 46
Hydrant bolts,	1,940 78
Pipe bolts,	1,933 70
Photographs,	328 25
Hydrant heads,	7,511 51
Taps and stops,	19,239 83
Valve covers,	9,370 73
Service pipe,	50,683 43
Hydrant boxes,	30,191 67
Setting fire hydrants,	10,774 48
Check valves,	3,712 48
Valve boxes,	34,550 42
Air cocks, boxes, covers and setting,	527 09
Setting blow-offs,	331 49
Lobdell & Newmans,	188,025 00
A. & W. Sprague Manufacturing Co.,	2,500 00
Samuel M. Gray,	300 00
Paulding, Kemble & Co.,	109,265 54
Thomas Phillips & Co.,	4,283 84
James Glass,	4,495 26
Providence Steam Engine Co.,	47,063 01
Rhode Island Locomotive Works,	30,145 71
Architectural Iron Works,	30,520 35
French, Mackenzie & Co.,	3,150 00
Wescott Reservoir Co.,	44 45
Akron Sewer Pipe Association,	5 25
Sewer department, salaries and office expenses,	709 68
City Treasurer,	282,012 39
City Treasurer, for water payments,	545,374 12
Testing pipe iron,	443 50
Iron drain pipes and gate,	224 31
Carting pipes,	40,301 87
Amount carried forward,	\$4,270,397 68

Amount brought forward,	\$4,270.397 68
Counsel fees,	5,500 00
Inspection of pipes,	10,312 23
Testing bolts and composition castings,	31 25
Laying water pipes,	406,226 18
Laying service pipes,	32,549 24
Laying suction pipe, etc.,	85 00
Drainage pump and engine,	5,110 73
Hydrants for street sprinklers, etc.,	2,639 50
Inspection of pipe laying,	33,978 14
Temporary boarding house at Pettaconset,	1,433 23
Public drinking fountains and troughs,	3,701 29
Warwick test pits,	1,313 40
Engine house at Pettaconset, for drain,	2,132 37
Water meters set, belonging to the city,	1,258 72
Worthington pumping engine,	35,522 33
Hope pumping engine,	63,104 67
Cornish pumping engine,	11,345 47
Keeper's house at Sockanosset reservoir,	7,088 81
Pipe in river embankment at Pettaconset,	4,067 82
Inspection of engine work,	5,287 08
Alterations at Hope pumping station for second engine,	784 59
Testing second engine at Hope pumping station,	4,779 63
Drain tiles,	489 79
Rollers for Cornish engine,	9,449 08
Stand pipe at Pettaconset,	956 89
	<hr/> \$4,919.738 13

ENGINEERING DEPARTMENT:—

For Instruments,	3,452 31
Tools,	736 87
Furniture, stoves, gas fixtures, &c ,	2,893 99
Draughting,	3,523 53
Labor,	9,945 58
Horse and wagon account,	2,814 65
Horse keeping, shoeing, etc.,	2,848 94
Horse hire,	5,499 65
Rent of offices,	7,081 87
Fuel and lights,	749 83
Janitor of rooms,	1,306 76
Experimental filter,	91 08
Books, stationery, etc.,	3,619 04
Sundries,	3,802 39
Test wells,	1,579 40
Consultations,	827 08
Office building at Pettaconset,	567 00
Office building at Sockanosset reservoir,	563 22
Stakes and strips,	1,318 24
Printing,	671 48
Maps,	170 17
Service pipe experiments,	290 04
Temporary assistance,	11,168 28
Salaries,	98,904 50
	<hr/> \$164,444 05
Amount carried forward,	<hr/> \$5,084.182 18

REPORT OF THE WATER COMMISSIONERS. 25

Amount brought forward,

\$5,084,182 18

MAINTENANCE:—

Hope pumping station, for coal and wood,	\$9,034 97
“ “ “ “ engineers,	4,257 56
“ “ “ “ firemen,	2,844 85
“ “ “ “ lights,	1,786 85
“ “ “ “ sundries,	799 59
“ “ “ “ night and Sunday watch,	41 23
“ “ “ “ labor on fuel,	4 50
Pettaconset pumping station, for coal and wood,	31,886 91
“ “ “ “ engineers,	7,635 86
“ “ “ “ firemen,	6,647 03
“ “ “ “ labor on fuel,	3,098 89
“ “ “ “ sundries,	3,283 00
“ “ “ “ night and Sunday watch,	3,063 53
Sockanosset reservoir, for watch,	3,784 25
“ “ “ “ sundries,	7,234 25
Hope reservoir, for watch,	615 00
“ “ “ “ sundries,	2 96
Ascertaining and removing nuisances on Pawtuxet river,	479 48
Worthington pumping engine,	7,762 90
Hope pumping engine,	339 91
Miller boilers at Pettaconset,	142 36
Change of grades,	2,254 97
Inspection of water fixtures,	5,729 10
Repairs on pipe line,	9,739 90
Meter testing room,	270 91
Setting, inspection and repair of meters,	759 26
Commissioners' salaries,	8,333 39
Secretary's salary,	2,855 62
Clerks' salaries,	6,696 69
Rent of offices,	1,412 48
Fuel and lights,	64 71
Janitor of rooms,	281 54
Books, stationery, etc.,	603 26
Printing,	778 44
Advertising,	83 41
Sundries,	411 53
Counsel fees,	1,000 00
Thawing pipes, gates, etc.,	1,264 82
Supplying water takers, by reason of frost,	1,280 38
Engineering department, for rent of offices,	2,930 96
“ “ “ “ fuel and lights,	147 11
“ “ “ “ janitor of rooms,	574 47
“ “ “ “ books, stationery, etc.,	293 85
“ “ “ “ printing,	214 36
“ “ “ “ salaries,	17,533 52
“ “ “ “ sundries,	29 52
	161,560 14
	\$5,245,742 32

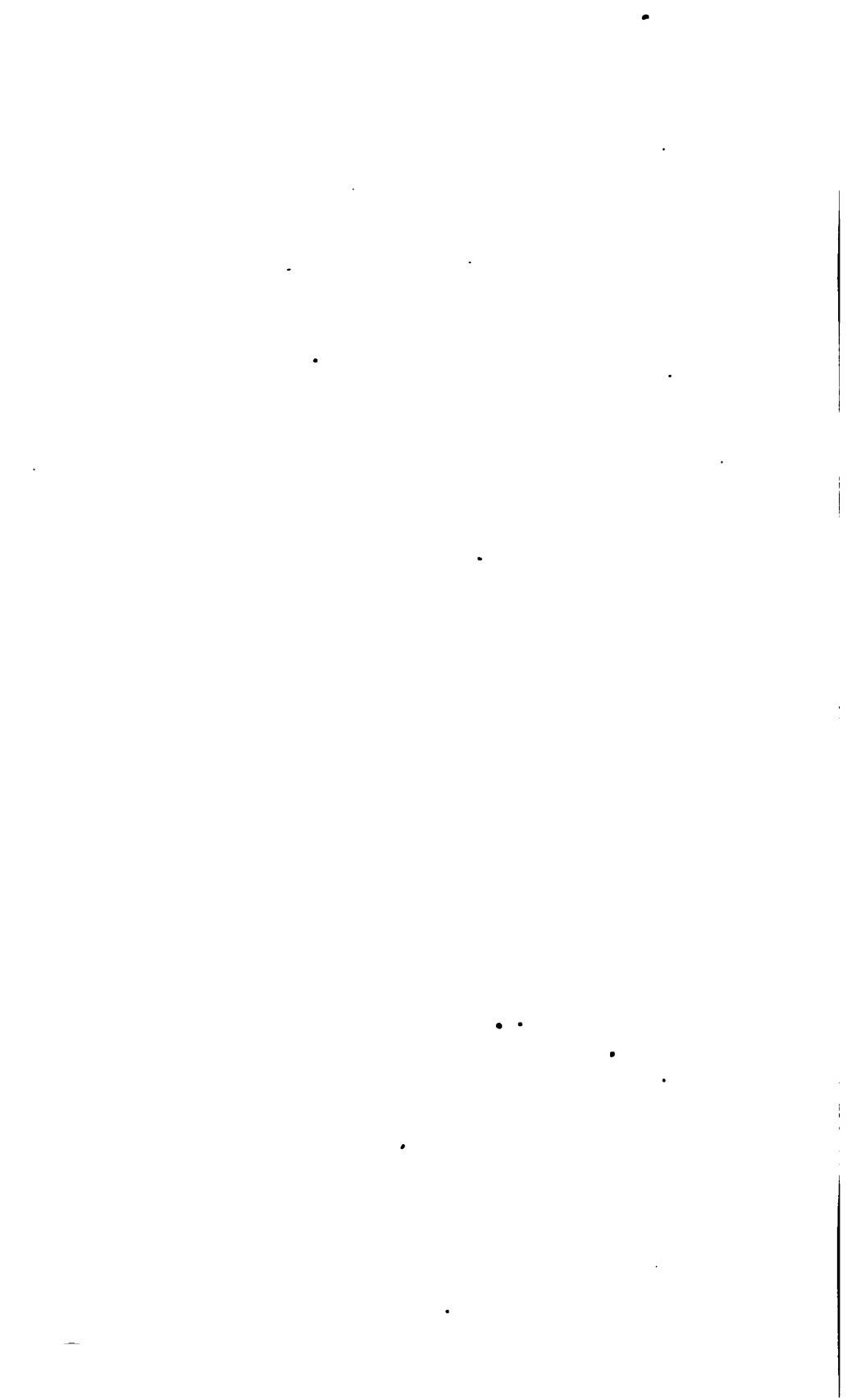
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Foster S. Dennis,	\$1,550 00
Boston hydrants,	29 07
Water meters,	1,384 12
Penalties,	484 00
Water,	545,374 12
Approved bills,	4,696,921 01
	\$5,245,742 32

SCHEDULE OF RECEIPTS FOR WATER, BY MONTHS, FROM
COMMENCEMENT TO FEBRUARY 29, 1876, INCLUSIVE.

MONTHS.	1872.	1873.	1874.	1875.	1876.
January		\$40,699 09	\$60,356 70	\$92,102 10	\$106,847 71
February	\$796 06	4,314 80	3,678 96	4,674 19	2,939 71
March	6,671 82	6,669 73	9,221 19	4,777 42	.....
April	1,068 59	2,810 07	4,936 98	10,093 32	.....
May	2,063 41	1 766 28	2,338 59	2,574 93	.....
June	9,634 89	8,228 92	2,583 35	8,140 99	.....
July	3,488 27	6,214 24	13,756 51	9,035 23	.....
August	1,818 14	1,441 09	1,933 37	4,001 66	.....
September	4,933 44	7,559 64	5,541 34	5,393 34	.....
October	5,079 08	8,745 53	9,097 95	13,578 46	.....
November	477 01	872 83	1,511 03	1,291 59	.....
December	5,372 77	8,072 87	8,076 42	9,481 49	.....
	\$41 003 51	\$97 386 09	\$132,052 89	\$163,144 71	\$109,787 42

APPENDIX.



REPORT
OF THE
COMMITTEE OF EXPERTS.

HOPE STATION,
PROVIDENCE, R. I., January 1st, 1876. }

To JOSEPH J. COOKE,
CHAS. E. CARPENTER, } Water Commissioners,
WILLIAM CORLISS, }
and

THE PROVIDENCE STEAM ENGINE COMPANY,
HENRY W. GARDNER, Treasurer.

GENTLEMEN:—The committee appointed by you November 12th, 1875, in accordance with the contract hereto appended, met at Hope station December 20th, 1875, and commenced the work assigned them.

According to the committee's interpretation of this contract, they are to determine and answer the following questions:—

First. Is the engine capable of delivering 5,000,000 U. S. gallons of water per twenty-four hours, under a mean pressure per square inch on the pumps, equivalent to one hundred and twenty (120) feet above low water as defined by the contract; being the equivalent pressure due to high water in the high service, or two hundred and sixty-two and a half (262.5) feet above tide?

Second. Can the engine perform this work with ease?

Third. Can the engine perform this work under a possible varying head of forty feet on the suction?

Fourth. Can the engine perform this work and run smoothly?

Fifth. Can the engine perform this work while taking its supply of water from the low service distribution, and pump it into the high service distribution?

Sixth. Can the engine take its supply of water from the low service distribution, and deliver at the rate of three hundred and fifty thousand (350,000) gallons per twenty-four hours, into the high service distribution, and run smoothly while doing it?

Seventh. Can the engine pump two million (2,000,000) gallons in twenty-four hours, pump it against a pump pressure per square inch equivalent to one hundred (100) feet head as defined by the contract, and make a *duty* of not less than seventy-five million (75,000,000) foot pounds per hundred pounds of coal consumed? the conditions being similar to those obtaining in the trial of the Lynn pumping engine in December, 1873.

Eighth. Can the engine perform this work and duty and run smoothly?

Ninth. Does the engine in all other respects conform to the conditions of this contract?

For the purpose of determining and answering these questions, the committee have conducted a series of trials, tests, and experiments, extending over ten days in duration, and herewith submit their conclusions:—

First. Is the engine capable of delivering five million (5,000,000) U. S. gallons of water per twenty-four hours, under a mean pressure per square inch on the pumps equivalent to one hundred and twenty (120) feet above low water as defined by the contract; being the equivalent pressure due to high water in the high service, or two hundred and sixty-two and a half (262.5) feet above tide?

Answer. The engine pumped from 1 hour 0 min. and 30 sec. P. M., December 29th, to 2 hours 0 min. and 30 sec. P. M., December 30th, 1875, twenty-five hours, 5,319,589 U. S. gallons of water, being at the rate of 5,106,805 gallons per twenty-four hours, partly from the low service distribution, and partly from Hope reservoir, into the high and low service distribution, under a mean pressure per square inch equivalent to one hundred and twenty-five and a quarter (125.25) feet above low water as defined by the contract. This water was all pumped into the high service distribution, and that not required in said high service was forced back into the low service distribution, through one twenty-four inch gate sufficiently throttled to maintain the pressure, and located on Thayer street, opposite the terminus of Hope street, near the southeasterly corner of Hope reservoir, and partly through a six-inch relief valve connecting the suction and pump mains in the engine house at Hope station. The engine did, therefore, in the opinion of the committee, perform the equivalent of this first requirement of the contract, and is capable of doing exactly what the contract requires whenever the water can be disposed of in the high service. The reason for forcing any water back into the low service, was because there exist at present no means or provisions for disposing, without wasting, such a quantity of water in the high service.

Second. Can the engine perform this work with ease?

Answer. This work was performed within the capacity of the engine, without danger of breakage in any part, and therefore we say with ease.

Third. Can the engine perform this work under a possible varying head of forty feet on the suction?

Answer. The head upon the suction during this trial varied from 0 feet to about 34 feet. The reason for not attempting to produce, during this trial, the extreme variation of forty feet head upon the suction, was the fact that there were no facilities in existence for producing it, but had there been

such facilities, we are of the opinion that the engine would have pumped this quantity of water under said variation.

Fourth. Can the engine perform this work and run smoothly?

Answer. The greater portion of the engine did run smoothly, but certain parts did not, viz.: the crank-pin connection with the piston rod of the low pressure cylinder, the combs for automatically oiling the slides of the cross-head to piston rod of the high pressure cylinder, the cut-off cam and rod, the Allen speed governor, the rod through which the rock shaft was operated, the crank-pin connection of pump-plunger rod of pump No. 2, and the air-pump. These, however, are all imperfections in details, which can be remedied.

Fifth. Can the engine perform this work while taking its supply of water from the low service distribution, and pump it into the high service distribution?

Answer. It can.

Sixth. Can the engine take its supply of water from the low service distribution and deliver at the rate of three hundred and fifty thousand (350,000) gallons per twenty-four hours, into the high service distribution, and run smoothly while doing it?

Answer. It can deliver this minimum quantity by the use of a by-pass which was provided for this purpose in the construction of the engine. Without the use of such by-pass, or its equivalent, the engine cannot do it.

Seventh. Can the engine pump two million (2,000,000) gallons (U. S. standard) in twenty-four hours, pump it against a pump pressure per square inch equivalent to one hundred feet of head, as defined by the contract, and make a duty of not less than seventy-five million (75,000,000) foot pounds per hundred pounds of coal consumed? the conditions being similar to those obtaining in the trial of the Lynn pumping engine, in December, 1873.

Answer. The engine pumped at the rate of a little more than two million (2,000,000) gallons per twenty-four hours

by weir measurement, and made a duty of 84,637,245 foot pounds per hundred pounds of coal consumed.

This work and duty were obtained during a continuous run of fifty-six hours, fifty-one (51) of which were selected by omitting some hours at the beginning and some at the end of the trial, for which fifty-one hours the calculation is made; all the coal put into the furnace was charged to the engine, and no deduction made for clinkers, ashes or cinders.

Eighth. Can the engine perform this work and duty and run smoothly?

Answer. It did run smoothly while performing this work and duty.

Ninth. Does the engine in all other respects conform to the conditions of this contract?

Answer. In quality of material and character of workmanship, the engine now conforms to the conditions of the contract, and if the imperfections named in the answer to question fourth are remedied, it will conform in all respects definitely named in the contract, as well as to the implied requirements of the water service in supplying the fire department.

There was a test trial made on the fire hydrants of the high service by the fire department, at the request of the mayor of the city, which test we are informed was of unusual severity. It took place during our experiments, and the engine successfully met the requirements of the occasion.

As to whether the engine conforms to the first paragraph in this contract, and other provisions, which we have not specifically answered, we have no means of determining.

We have given in this report only our conclusions as to the requirements of this contract, but we intend to present in a supplementary report, full details of our experiments.

Respectfully,

CHAS. HERMANY,	} Committee.
JAMES B. FRANCIS,	
CHANNING WHITAKER,	

CONTRACT

FOR BUILDING A PUMPING-ENGINE AND ERECTING THE SAME AT
HOPE STATION.

This Agreement, made and concluded this seventh day of September, eighteen hundred and seventy-four, by and between the City of Providence, represented by its Water Commissioners, of the first part and the Providence Steam Engine Company, of the second part, witnesseth :

That, in consideration of the covenants and agreements hereinafter contained, the said party of the second part agrees to construct, deliver and set up, in the engine-house at Hope Station, a pumping-engine of the general dimensions and design explained and exhibited in the proposals made to the Water Commissioners by said party of the second part, dated August 25th and September 4th, of this year, and in the drawings or plans to which the first named of said proposals refers; together with the boilers, foundations and other appurtenances therein described, or necessary for the full and complete operation of the aforesaid engine in performing its required duties. hereinafter set forth.

The engine is to be capable of raising with ease five million gallons of water in twenty-four hours, to a height of one hundred and twenty feet above low water, (low water being six inches above the main floor of the engine-house,) under a possible varying head of forty feet on the suction; is to work smoothly under the above conditions, and also when delivering but three hundred and fifty thousand gallons in twenty-four hours; is to be attached to the suction and force mains now located at said Station; is to pump directly into the distributing pipes, and is to perform a duty of seventy-five million foot pounds per one hundred pounds of coal.

The quality of the materials and workmanship hereby agreed to be furnished is to be first class in every respect; all of the materials used are to be of the best kind and quality employed in their respective places, and are to be satisfactory to the Chief Engineer of the Providence Water Works.

The party of the second part hereby guarantees the strength, as well as the quality of the materials and workmanship of all the parts, and to make good at its own cost, all outlays and injuries caused from defects in the same during the first twelve months of the working of the engine.

The Chief Engineer, or his authorized agent, shall at all times have access to the proper works or shops, during the construction of the work, and he shall be furnished, whenever required, with specimens of the materials of proper form for testing, and every reasonable facility shall be

PUMPING ENGINE AT HOPE STATION. ix

afforded him to ascertain that the stock and materials employed, and the workmanship, are in accordance with the requirements of this contract and the intention thereof.

In case the party of the second part should find it desirable to make any modification in the form, or to increase the strength or mass of any part of the machinery, the Chief Engineer, with the consent of the Water Commissioners, may permit the change to be made.

Should the Chief Engineer consider it to be desirable that any change should be made in the form or character of any of the parts, whether to increase the strength or otherwise, he may order such alteration to be made, and it shall be made accordingly by the party of the second part, without any charge for such change or changes.

And said party of the second part hereby further agrees that it will forever protect, defend and save harmless said City of Providence and said Board of Water Commissioners against any claim or demand, by whomsoever made, for patent fees or any patented article, invention or arrangement that it may use in the construction of the work, and against any claim for compensation for the design of said engine, and before the final payment shall be made, shall furnish said Board of Water Commissioners with a satisfactory bond of indemnity against all such claims.

The delivery of the different parts of the work and its erection are to be so managed as to interfere with or hinder, as little as possible, the supply of water to the High Service, or with any other work in progress under the direction of the party of the first part, and said party of the first part shall not be held responsible for the safe keeping of all or any of the parts, however or wherever delivered.

When, in the opinion of the aforesaid Chief Engineer, one-third, in value, of the whole work herein contracted for, shall be completed, a payment of eleven thousand dollars, (being twenty per cent. of the contract price,) is to be made to the party of the second part; and when two-thirds of the work shall be completed, a further payment of eleven thousand dollars shall be made.

All materials of whatever description, upon which advances may be made, shall become thereby, so far as acceptable in other respects, the exclusive property of the party of the first part, but this right of property as a gauge for such advances, shall not be construed as binding the first party to receive and admit of the application of all such materials to the machinery or works, if any of them should afterwards be found objectionable or imperfect; all objectionable materials, articles or workmanship, when discovered, shall be replaced on the requirement of the aforesaid Engineer by sound and satisfactory work.

The engine, when completed and ready for service, shall be subjected to a trial test for duty and capacity; such trial to be made by three persons selected by the party of the second part from a list of ten disinterested experts of good reputation to be named by the Water Commissioners. The conditions of the trial are to be similar to those adopted in the trial of the Lynn pumping engine in December, 1873.

The aforesaid committee of experts shall report to both parties the result of the trial.

The engine is to be erected, ready for service before July 1st. 1875.

The said party of the second part hereby further agrees that it will furnish said Water Commissioners with satisfactory evidence that all persons who have done work or furnished materials under this agreement, and are entitled to a lien therefor under any law of the State of Rhode Island, have been fully paid or are no longer entitled to such lien, and, in case such evidence be not furnished as aforesaid, such amount as said Commissioners may consider necessary to meet the lawful claims of the persons aforesaid, shall be retained from the moneys due said party of the second part under this agreement, until the liabilities aforesaid shall be fully discharged, and evidence therefor furnished said Commissioners.

The sum to be paid by said party of the first part to said party of the second part, in full compensation for all work and supplies indicated in this contract, is fifty-five thousand dollars, (hereinbefore named as the "contract price.") *provided*, that it shall appear from the report of the committee of experts hereinbefore provided for, that the duty of said engine, as tested by them, is at least seventy-five million foot pounds per one hundred pounds of coal, when delivering two million gallons of water in twenty-four hours, against a head of one hundred feet, and also that, in all other respects, it conforms to the conditions of this contract. In case, however, that said committee shall report that the duty of said engine, under said circumstances, is less than seventy-five million foot pounds per one hundred pounds of coal, or that otherwise said engine does not conform to the conditions of this contract, then said party of the second part shall promptly refund to said party of the first part any and all payments which may have been made by said party of the first part to said party of the second part on account of said work, and, with all reasonable diligence, at its own cost, remove said engine and appurtenances.

On condition of the true and faithful performance of all the conditions of this contract, which shall appear by the certificate of the aforesaid Chief Engineer, the balance of the said sum of fifty-five thousand dollars, which may remain due, shall be paid to said party of the second part by said party of the first part, in full payment for all the work and supplies as aforesaid; such work and supplies embracing, in all respects, the perfect and satisfactory construction and erection of a complete and serviceable engine of the character indicated.

The aforesaid Chief Engineer shall decide as to the meaning and intent of any portion of this agreement, where the same may be found obscure, and he shall have the right to correct any errors or omissions therein, when such correction is necessary for the proper fulfillment of its intention.

It is also understood that the party of the second part shall, at its own expense, insure all work on which payments have been made, against

PUMPING ENGINE AT HOPE STATION. xi

loss or damage by fire,—until the acceptance of said work or the advances made shall have been refunded,—for the benefit of said party of the first part.

In witness whereof, the parties to these presents, have hereunto set their hands and seals, the day and year first above written.

The City of Providence,
by its Board of Water
Commissioners,

}

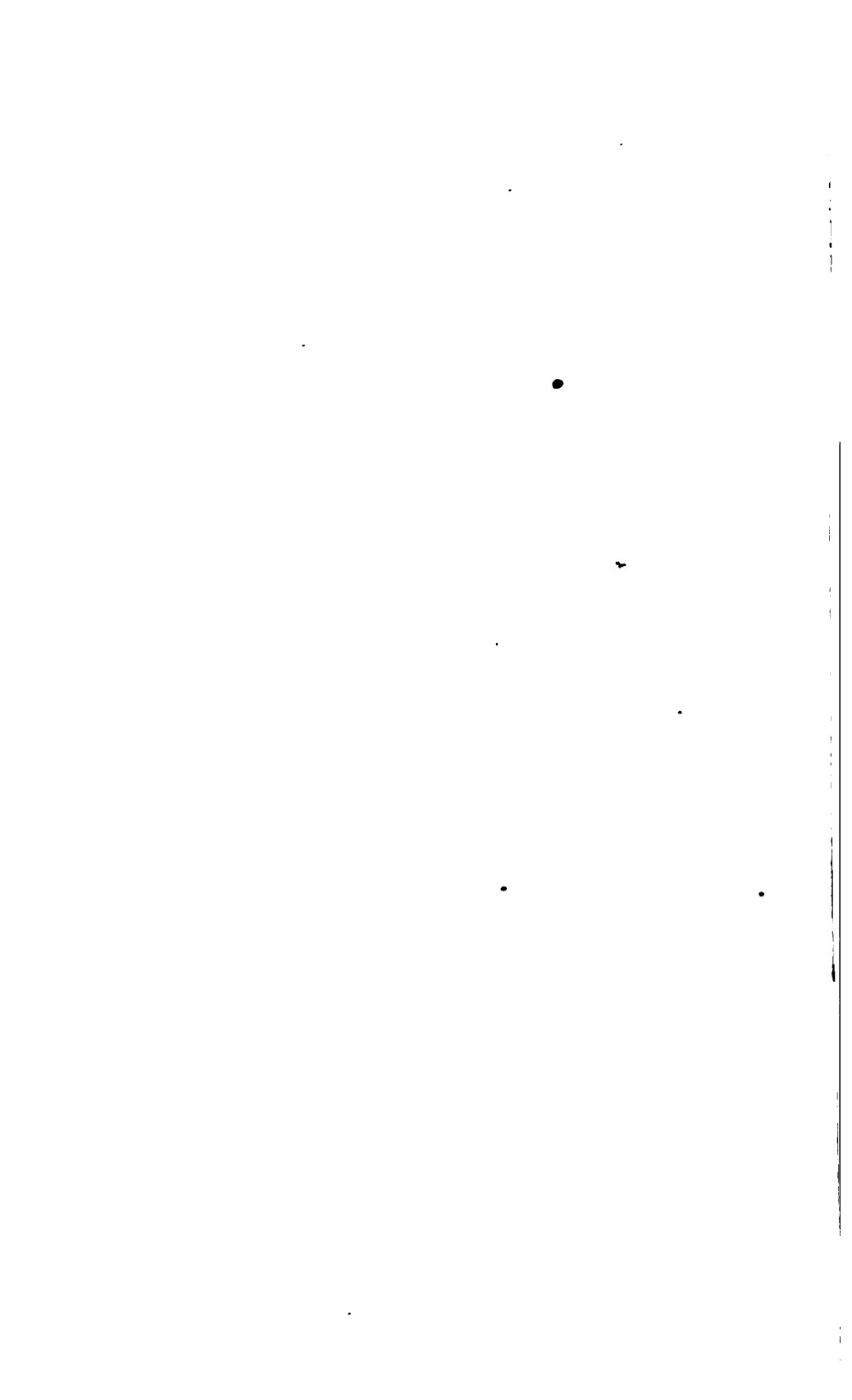
JOSEPH J. COOKE,
CHAS. E. CARPENTER,
WILLIAM CORLISS.

Providence Steam Engine Co.,
HENRY W. GARDNER, Treas.

Signed, sealed and delivered in presence of CLINTON D. SELLEW,
Witness to all the signatures.

Approved:

N. VAN SLYCK,
City Solicitor.



1876.]

CITY DOCUMENT.

[No. 28.]

NINTH QUARTERLY REPORT

OF THE BOARD OF

WATER COMMISSIONERS

OF THE

CITY OF PROVIDENCE,

[Elected February 27, 1874.]

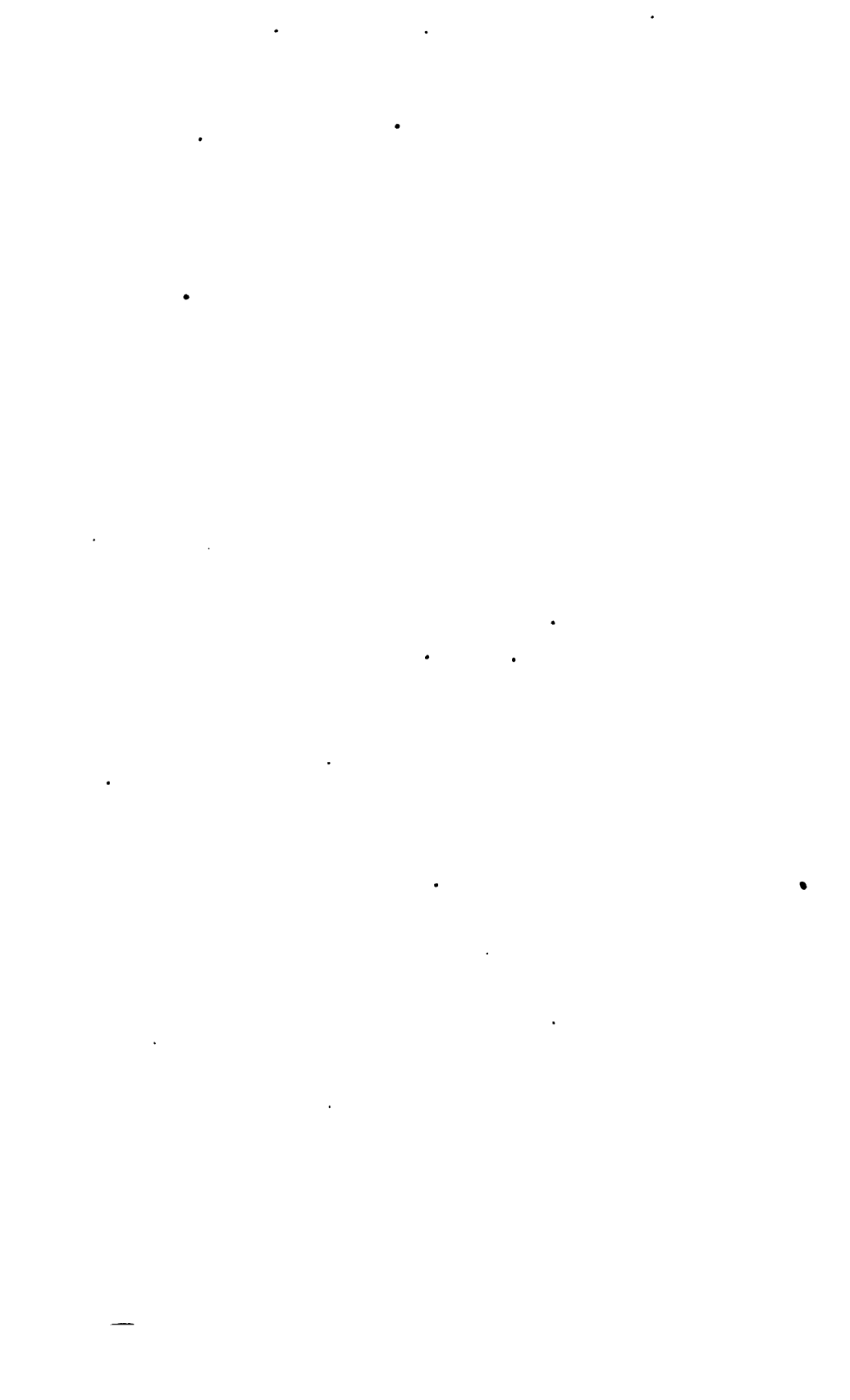
JUNE 1, 1876.



PROVIDENCE:

PROVIDENCE PRESS CO., PRINTERS TO THE CITY.

1876.



ORGANIZATION
OF THE
PROVIDENCE WATER WORKS.

BOARD OF WATER COMMISSIONERS.

JOSEPH J. COOKE, PRESIDENT.

CHARLES E. CARPENTER,
WILLIAM CORLISS.

SECRETARY OF THE BOARD OF WATER COMMISSIONERS.

CLINTON D. SELLEW.

Office No. 35 North Main Street.

CHIEF ENGINEER.

J. HERBERT SHEDD.

Office No. 35 North Main Street.

REPORT.

OFFICE OF THE BOARD OF WATER COMMISSIONERS, }
PROVIDENCE, R. I. June 1, 1876. }

TO THE HONORABLE THE CITY COUNCIL :—

The undersigned Water Commissioners, elected February 27, 1874, under “An Ordinance to establish a Board of Water Commissioners,” approved same day, respectfully present their Ninth Quarterly Report.

Thomas L. Botts has been appointed Assistant Engineer, for such time as the work shall require his services, with a salary at the rate of eight hundred dollars per annum, dating from April 20th, 1876. Mr. Botts had served for three years as a student in the Engineering Department.

Frank B. Ferris has been appointed Assistant Engineer, for such time as the work shall require his services, with a salary at the rate of eight hundred dollars per annum, dating from April 20th, 1876. Mr. Ferris had served for three years as a student in the Engineering Department.

William H. Olmsted, who has been three years a student in the Engineering Department, has been appointed Assistant Engineer for such time as the work shall require his services, with a salary at the rate of eight hundred dollars per annum, dating from April 26th, 1876.

Albert L. Bodwell, who has also been a student in the Engineering Department, has been appointed an Assistant Engineer, for such time as the work shall require his services, with a salary at the rate of eight hundred dollars per annum, dating from May 25th, 1876.

An agreement has been made with John West, of Reading, Pennsylvania, who has been acting as consulting and superintending engineer in charge of the Cornish Engine at Pettaconset, for the superintendence of the running of the engine for three months after the expiration of the time previously agreed upon, (thirty days after starting,) for the sum of fifteen hundred dollars.

A contract has been executed with Charles P. Chapman, of Westerly, for furnishing granite steps, fence curbing, posts, coping, &c., at Hope Reservoir for the sum of forty-eight hundred and sixty-eight dollars.

An offer of James H. Tower, of Providence, to build about 3000 feet of iron fence, on the street lines, on three sides of Hope Reservoir, $3\frac{1}{2}$ feet high, upright bars of $\frac{7}{8}$ inch square iron, 5 inches between centres, top bar to be $2\frac{1}{2}$ by $\frac{1}{2}$ inch, and the whole to be painted one coat, at one dollar and forty-eight cents per foot, including gates of the same pattern, has been accepted.

An offer of French, Mackenzie & Co., to furnish the materials and erect a balcony rail on second floor of the Engine House at Pettaconset, and for covering pipes from wall of Engine House to boilers, according to plans and specifications, for the sum of seven hundred and fifty dollars, has been accepted.

An offer of the Rhode Island Concrete Co., to concrete around service boxes for the sum of twenty-four and one-half cents each, has been accepted.

REPORT OF THE WATER COMMISSIONERS. 7

An offer of Tingley Marble Co., to furnish the materials and lay the floor at Hope Engine House, (the best white marble for such purpose and American black marble to be used,) for the sum of eighteen hundred dollars, has been accepted.

An offer of Harrison Hallett to paint the iron work on Engine House and Boiler House at Pettaconset, for the sum of six hundred and seventy dollars, has been accepted.

The farms in Warwick, purchased of Richard U. Rhodes and wife, and of Miss Patience W. Chace, have been leased to John Smurthorst; the former for one year from March 1, 1876, at two hundred and twenty-five dollars; and the latter for one year from March 31, 1876, at one hundred and seventy-five dollars, each payable quarterly in advance.

The Cornish Engine at Pettaconset having been subjected to the contract test of running five days, (of 24 hours,) has been accepted by the Commissioners. Some relatively unimportant adjustments remain to be made at the expense of the manufacturers. A delay of several weeks occurred, owing to the breakage of the air pump, caused by a change of form not duly authorized. The engine has developed a *capacity* to pump $10\frac{1}{4}$ million gallons in twenty-four hours. A better duty and consequently more economical use was when pumping about 7 millions in that time. Further trial may show a point between as the best. The duty attained was 91 million foot pounds, which may probably be increased by use, improved packing, etc., to 100 millions.

The second engine at Hope Station, is working satisfactorily.

The daily consumption of water, including waste and leakage, during the last quarter, was about 2,000,000 gallons.

Plumbers' licenses have been issued as follows:

Elery A. Pearce,

Richard I. Steele.

On the 8th day of May, 1876, Alexander Eccles, surrendered his plumber's license.

The whole number of plumbers' licenses issued is sixty-six. Suspended, three. Revoked, one. Surrendered, one. Remaining in force, sixty-one.

The following statement shows the length of pipes laid during the last quarter; the sizes of the pipes; where laid; and the totals since the commencement of the work :

16 INCH.

In Thurber's avenue, -	-	-	-	842 feet.
Including 3 cut pipes, 4 branches and 1 gate.				
Previously,	-	-	-	23,202 feet.
Total,	-	-	-	24,044 feet.

12 INCH.

In Chalkstone avenue,	-	-	-	267 feet.
Including 1 branch.				
Previously,	-	-	-	32,031 feet.
Total,	-	-	-	32,298 feet.

8 INCH.

In Lexington and Plainfield streets, Johnston,				4,232 feet.
Including 15 cut pipes, 4 curved pipes, 28 branches and 5 gates.				
Previously,	-	-	-	74,590 feet.
Total,	-	-	-	78,822 feet.

6 INCH.

In Back, Beacon, Beverly, Brown, Burgess, Burnett, Burnside, Dora, Fletcher, Francis, Fremont, Grove, Hoyle, Mill, Niagara, Plane, Republican, School, South Water,

REPORT OF THE WATER COMMISSIONERS. 9

and Zone streets ; in Academy, Harris, Potter's, Prairie and Young Orchard avenues, and in Arnold and Plainfield streets, Johnston,	-	-	-	-	-	19,497 feet.
Including 93 cut pipes, 24 curved pipes, 64 branches and 32 gates.						
Previously,	-	-	-	-	-	395,622 feet.
Total,	-	-	-	-	-	415,119 feet.
<hr/>						
Total of all sizes during the last quarter,	-	-	-	-	-	24,838 feet.
or 4 $\frac{704}{1000}$ miles.						
Previously, including 10, 20, 24, 30 and 36 inch, of which none have been laid during the last quarter,	-	-	-	-	-	635,229 feet.
Total,	-	-	-	-	-	660,067 feet.
or 125 $\frac{12}{1000}$ miles.						

Thirty-eight fire hydrants have been set during the last quarter, one in each of the following locations, those marked * being in Johnston :

Academy avenue, east side, 360 feet north of Armington avenue,

Academy avenue, east side, opposite south building line of Armington avenue.

Academy avenue, east side, about 425 feet north of Atwell's avenue.

Academy avenue, east side, opposite south building line of Beaufort street.

Academy avenue, south-east corner of Chalkstone avenue.

" " east side, 230 feet south of Dover street.

* Arnold street, east corner of Lexington street.

* " " south-west corner of Trenton street.

Back " east side, opposite north line of Fletcher street.

" " " " about 140 feet north of Smith street.

- Bark street, at junction with Mill street.
- Beverly " north-west corner of Martha street.
- Brown " west side, half way between Halsey and Creighton streets.
- Dora " south side, about 350 feet east of Broad street.
- Francis " south-west corner of Wood's avenue.
- Fremont " north side, about 400 feet east of Ives street.
- Harris avenue, west side, about 360 feet north of Broadway.
- Hoyle street, east side, about 175 feet south of Fenner street.
- *Lexington street, north side, about 430 feet west of Webster avenue.
- *Plainfield street, northerly corner of Arnold street.
- * " " north-east corner of Bowen street.
- * " " " " " Eddy "
- * " " south " " " Latham "
- * " " north " " " Merino "
- * " " " west " " Mill "
- * " " " east " " Pioneer "
- * " " " west " " new street next west of Pioneer street.
- *Plainfield street, north side, in line with east side of Rocky Hill road.
- *Plainfield street, north-west corner of Webster street.
- Potter's avenue, south-west corner of Niagara street.
- Prairie " north-east corner of Colwell street.
- " " " " " Joy "
- " " east side, 160 feet south of Thurber's avenue.
- South Water street, east side, about 105 feet south of Farthing street.
- South Water street, north-east corner of India street.
- " " " " " " Pike "
- " " " south " " " Shamrock street.
- Thurber's avenue, east side, about half way between Prairie avenue and Burnside street.

The total number of fire hydrants is now nine hundred and fifty.

REPORT OF THE WATER COMMISSIONERS. 11

The height of water in Sockanosset Reservoir at 7 o'clock this morning was 179.90. High water in the reservoir is 180.50 (above high tide in Providence river).

The height of water in Hope Reservoir at 7 o'clock this morning was 162.10. High water in the reservoir is 162.50 (above high tide in Providence river).

Eighty-seven Ball & Fitts' water meters, made by the Union Water Meter Co., and twenty-eight water meters made by Fales, Jenks & Sons have been put in at the expense of water takers since the date of the last report. Three one-inch and three two-inch water meters, made by Fales, Jenks & Sons, have been set at the expense of the city. A five-eighths inch water meter made by Fales, Jenks & Sons has been substituted for a three-quarter inch meter of the same make, and the use of one three-quarter inch water meter made by Fales, Jenks & Sons has been discontinued, the building having been removed.

There are now twenty-five hundred and twenty-three water meters in use, viz. :

KIND.	SIZES.							TOTALS
	$\frac{1}{2}$ inch.	$\frac{3}{4}$ inch.	1 inch.	1 $\frac{1}{2}$ inch.	2 inch.	3 inch.	4 inch.	
Ball & Fitts.....	1,438	229	83	44	9	1	1	1,800
Worthington.....	168	.....	.....	.....	.....	.....	1	169
Fales, Jenks & Sons	7	454	25	.....	8	.....	.....	494
	1,668	683	108	44	17	1	2	2,523

The total number of applications for a supply of water is seventy-two hundred and twenty-two.

The number of new service stops opened during the last quarter is three hundred and twenty-one; two of which are for fire purposes only.

The number of service stops opened to date is sixty-two hundred and fifty-seven.

Fifteen stops have been closed during the last quarter for non-payment of bills, eight of which have been re-opened on payment of bills and a penalty in each case of two dollars. Thirteen stops previously closed for non-payment have been re-opened during the last quarter, in eight cases the bill and penalty of two dollars each, were paid, and the remaining five, for reason of attendant circumstances, were re-opened on payment of bills without penalty. The use of two stops previously closed for non-payment has been permanently discontinued, but the pipes remain in view of possible future use. Sixty-four stops closed for non-payment remain unopened. There are now in use six thousand and fifteen stops.

Water is now supplied for the following uses :—

3 armories ; 10 bakeries ; 36 banks ; 111 bar rooms ; 2 bath houses ; 1 bath house, Turkish ; 112 boarding houses ; 10 bottling establishments ; 37 building purposes ; 1 burying ground ; 2 car houses ; 2 carriage depositories ; 3 chasers ; 1 Christian Union ; 32 churches ; 1 city barn ; 2 city bridges ; 1 city building ; 14 city drinking fountains ; 26 city drinking troughs ; 950 city fire hydrants ; 5 city fire steamer stations ; 9 city hose stations ; 10 club rooms ; 14 coal yards ; 1 college ; 1 colored shelter ; 1 conservatory of music ; 4 convents ; 2 court houses ; 1 decorator ; 1 Dexter asylum ; 2477 dwellings of one family ; 2629 dwellings of two families ; 237 dwellings of three families ; 300 dwellings of four families ; 36 dwellings of five families ; 58 dwellings of six families ; 5 dwellings of seven families ; 7 dwellings of eight families ; 1 dwelling of nine families ; 1 dwelling of twelve families ; 2 dye houses ; 10

REPORT OF THE WATER COMMISSIONERS. 13

elevators; 1 engine turner; 5 engravers, 2 enamel works; 1 express carriage house; 56 fire supplies, private; 62 fountains, private; 1 fountain, public; 1 furrier; 3194 garden and street hydrants; 4 gas holders; 6 gold and silver refiners; 5 gold and silver platers; 2 grain elevators; 43 green houses; 21 halls; 1 home for aged women; 1 home for aged men; 2 hospitals; 18 hotels; 1 infirmary; 4 laundries; 3 libraries; 1 lithographer; 23 lodging houses; 2 lumber dealers; mason. *Manufacturing establishments*,—2 beer; 2 belt and picker; 3 blank book; 2 bleacheries; 1 bologna sausage; 1 bonnet bleachery; 2 boot and shoe; 2 box; 1 braiding works; 2 brass foundries; 2 breweries; 1 brush; 2 butt; 9 carriage; 2 cement pipe; 1 chain; 1 chemical; 6 cigar; 1 cigar box; 19 cloak and dress; 1 coffin; 9 confectionery; 1 corset; 3 colorers of jewelry; 9 cotton; 1 crocus; 3 dye sinkers; 2 dye wood; 1 emery wheel; 1 enameler of jewelry; 1 eyelet; 3 file; 9 furniture; 1 gas; 1 gas burner; 4 gas fixtures; 1 geer; 5 hat; 6 harness; 2 ice cream and soda water; 1 iron company; 1 iron fence; 10 iron foundries; 1 Japan switch; 1 jewelers' cards; 95 jewelry; 4 lapidaries; 28 machinists; 1 mowing machine; 1 nail keg; 2 oil; 1 organ; 1 paper box; 1 paper collar; 3 paper cop tube; 1 pattern; 4 patent medicines; 1 pencil case; 4 picture frame; 1 paint works; 2 pump; 2 reed; 1 rubber goods; 1 rubber tubing; 5 sash and blind; 1 saw; 2 screw; 1 sheet iron; 1 shell comb; 2 shirt; 3 silver ware; 6 soap; 1 spiral spring; 1 starch; 1 steam boiler; 2 steam engine; 1 stencil plate; 1 stove; 2 tanners; 2 thread; 1 tinware; 4 tool; 3 top roll; 6 woolen goods; 1 yeast. *Markets*,—49 fish; 116 meat. *Mills*,—2 drug and grain; 3 flour and grain; 1 paint; 10 planing. 1 nickel plater; 1 opera house; 2 orphan asylums; 9 organs; 5 oyster houses; 590 offices; 11 photographers; 10 printing establishments; 8 plaster and stucco workers; 12 plumbers; 12 provision curers and packers; 6 police stations; 7 railroads; 2 reading rooms; 44 restaurants; 1 roofer. *Saloons*,—5 billiard; 3 bowling; 6 ice cream; 27

SCHEDULE OF BILLS APPROVED BY THE BOARD OF WATER COMMISSIONERS, FROM MARCH 1, 1876, TO MAY 31, 1876, INCLUSIVE.

2828	Robert Millar, professional services, Simeon Noell, (one-half charged to Paulding, Kemble & Co.,)	\$350 00
2829	Architectural Iron Works, gate house roof, and iron bridge over waste way at Hope reservoir,	1,000 00
2830	Architectural Iron Works, on account for roof of engine house and boiler house at Pettaconset,	5,000 00
2831	Fred. Dean, labor, repairs to Hope pumping engine, &c.,	38 01
2832	Fales, Jenks & Sons, water meters,	765 95
2833	Freeborn & Crowell, labor and materials, painting roof and balcony of engine house at Pettaconset,	314 33
2834	William H. Smith, stone cutting, beam wall stones,	49 50
2835	Samuel M. Gray, horse hire, and paid by him for sundries,	87 13
2836	Paulding, Kemble & Co., on account for constructing pumping engine,	700 00
2837	Fuller Iron Works, special castings,	56 84
2838	G. & C. P. Hutchins, oil, lanterns, globes, gas fixtures, &c.,	39 73
2839	Daniel F. Burlingame, repairing tools, &c.,	17 11
2840	Dexter Gorton & Co., carpenter's work, lumber, &c.,	367 69
2841	R. S. Burrough & Co., oil,	48 06
2842	Fales, Jenks & Sons, water meters and repairing meters,	404 96
2843	Samuel L. Watson, boarding R. I. L. Works' men, (one-half charged to R. I. L. Works,)	106 00
2844	Tucker, Swan & Co., coal,	1,141 86
2845	Charles H. Pierce, on account for paying laborers,	200 00
2846	Hopkins & Pomroy, coal, cement and teaming,	250 79
2847	Josiah Cleveland, paving stones,	102 00
2848	Newport & Providence Lead Works, tin lined lead pipe,	179 34
2849	Providence & Worcester Railroad Co., transportation of cement, (charged to Paulding, Kemble & Co.,)	15 30
2850	C. E. Jencks, carpenter's work, &c., at Hope pumping station,	19 88
2851	Providence Steam and Gas Pipe Co., pipe and fittings, meter department,	65 39
2852	James Glass, labor and materials, slating roof of gate house at Hope reservoir and repairing Hope engine house,	495 04
2853	James Glass, on account for slating roof of engine house at Pettaconset,	200 00
2854	John Manning, teaming,	7 50
2855	Gunnison & Co., oil,	15 70
2856	Samuel L. Watson, teaming,	118 72
2857	Samuel M. Gray, paid by him for labor,	1,424 91
2858	Wood & Winsor, pipe and fittings, tools, &c.,	512 59
2859	Bugbee & Hall, stationery,	53 53
2860	Samuel M. Gray, on account for paying laborers,	500 00
2861	Charles H. Pierce, salary as assistant engineer,	250 00
2862	Otis F. Clapp, " " " "	208 33
2863	Howard A. Carson, " " " "	250 00
2864	Charles H. Swan, " " " "	206 33
2865	William T. Schneider, " " " "	100 00
2866	John E. Bowen, " " " "	100 00
2867	Leprilte Sweet, 2d, " " " "	83 33

Amount carried forward, . . . \$15,846 88

REPORT OF THE WATER COMMISSIONERS. 17

	Amount brought forward,	\$15,846 68
2868	Edmund B. Weston, salary as assistant engineer,	83 33
2869	William M. Brown, Jr., " " " "	83 33
2870	Daniel C. Stone, " " " "	83 33
2871	Edwin P. Dawley, " " " "	83 33
2872	William F. Janes, " " service pipe engineer,	83 33
2873	Augustus F. Nagle, " " mechanical "	100 00
2874	Frank B. Ferris, " " student, engineering department,	41 67
2875	Thomas L. Botts, " " " "	41 67
2876	William H. Olmstead, " " " "	41 67
2877	George B. Francis, " " " "	33 33
2878	Charles A. Harper, " " " "	33 33
2879	Alfred E. Martin, " " " "	33 33
2880	Albert L. Bodwell, " " " "	33 33
2881	Walter F. Slade, " " service pipe clerk, engineering department,	88 33
2882	William Aplin, " " clerk, engineering department,	88 33
2883	William H. Turner, " " " "	100 00
2884	Irvin F. Potter, " " " "	56 25
2885	Andrew B. Purdy, " " superintendent of pipe work,	166 67
2886	William H. Patterson, " " inspector on pipe line,	88 00
2887	S. Horace Wheeler, " " of service pipes,	125 00
2888	Henry M. Wilcox, " " assistant inspector of service pipes,	100 00
2889	Frederic A. Arnold, " " inspector of water fixtures,	100 00
2890	Albert C. Winsor, " " assistant inspector of water fixtures,	81 00
2891	Edward A. Moran, " " inspector of meters,	100 00
2892	William Clancey, " " plumber, meter department,	31 25
2893	James H. Higgins, " " " "	65 00
2894	John C. Lally, " " plumber's helper, meter department,	2 50
2895	Alexis C. Miller, " " keeper of Hope reservoir,	77 50
2896	Jephtha Baker, " " " " Sockanosset reservoir,	77 50
2897	Albert E. Angell, salary as temporary assistant, engineering department,	45 50
2898	George H. Slade, salary as temporary assistant, engineering department,	45 20
2899	Edward C. Reynolds, salary as temporary assistant, engineering department,	89 00
2900	George W. Winsor, Jr., salary as temporary assistant, engineering department,	83 75
2901	Henry G. Dennis, salary as superintendent of pipe yard,	125 00
2902	Richard M. Wood, salary as clerk at pipe yard,	83 33
2903	John Cuthbert, salary as pumping engineer, Pettaconset station,	104 17
2904	George F. Barney, salary as fireman, Pettaconset station,	60 00
2905	Patrick O'Rourke, " " " "	70 00
2906	John Hamilton, " " " "	85 00
2907	John Tallent, " " " "	48 00
2908	John Quinn, " " pumping engineer, Hope station,	125 00
2909	Marcus E. Sherman, " " " "	100 00
2910	Judson Davis, " " fireman, Hope station,	65 00
2911	Michael Hamill, " " " "	65 00
2912	William F. Tanner, " " axeman,	42 00
2913	Jesse W. Coleman, " " commissioners' clerk,	50 00

Amount carried forward \$19,144 94.

	Amount brought forward,	\$19,144 94
2914	Leonard N. Austia, Jr., salary as commissioners' clerk,	75 00
2915	Thomas C. Gushee, " " " "	100 00
2916	Phillip S. Chase, " " " "	150 00
2917	Clinton D. Sellew, salary as secretary of water commissioners,	200 00
2918	John Funnell, " " janitor, &c.,	50 23
2919	Charles H. Pierce, paid by him for sundries,	43 30
2920	Charles H. Pierce, " by him for labor,	825 00
2921	Charles H. Pierce, on account for paying laborers,	200 00
2922	Samuel M. Gray, engineering services, self and assistants,	173 22
2923	R. I. Hospital, board and attendance for Simeon Noell, (one-half charged to Paulding, Kemble & Co.,)	144 00
2924	Robert Morrow, horse hire by engineers,	15 00
2925	I. B. Mason, lard,	5 95
2926	A. W. Page, tallow,	5 60
2927	Olney Brothers, oil,	12 79
2928	James H. Munroe, inspection of boiler at Hope pumping station,	5 00
2929	A. Carpenter, castings, brackets on stand pipe,	16 00
2930	Abbott Lawrence, expressage on meters,	12 35
2931	B. F. Almy, cop waste,	10 00
2932	W. Congdon & Sons, steel tape, &c.,	22 80
2933	Newport & Providence Lead Works, lead,	183 20
2934	W. Coleman & Sons, tools,	15 10
2935	Barker, Whitaker & Co., lead, nails, tools, &c.,	114 56
2936	William H. Miller & Co., tools, repairing tools, &c.,	63 98
2937	George W. Smith, stone cutting at Pettaconset, Hope reservoir, &c.,	61 37
2938	Providence Gas Co., gas,	263 17
2939	J. W. & J. J. Newman, labor at Hope pumping station,	5 37
2940	James Lankin, " " " " "	10 63
2941	George W. Mitchell, " " " " "	11 49
2942	Tuttle & Hobbs, horse keeping,	234 00
2943	Hopkins & Pomroy, coal, cement, teaming, &c.,	969 47
2944	Hopkins & Lyon, horse shoeing,	5 50
2945	Fales, Jenks & Sons, water meters,	416 00
2946	James H. Munroe, inspection of Worthington boilers at Pettaconset station,	10 00
2947	Providence Steam Engine Co., on account for constructing pumping engine,	5,000 00
2948	R. S. Burrough & Co., oil,	98 10
2949	A. C. Eddy & Studleys, hose and couplings, rubber packing, &c.,	269 39
2950	Thomas Phillips & Co., lead pipe,	442 42
2951	Charles H. Pierce, on account for paying laborers,	400 00
2952	Tucker, Swan & Co., coal,	509 37
2953	William H. Miller & Co., tools, repairing tools, &c.,	73 24
2954	Dexter Gorton & Co., carpenter's work, lumber, &c.,	443 10
2955	Samuel M. Gray, paid by him for labor,	1,147 03
2956	Samuel M. Gray, horse hire, &c.,	76 41
2957	Samuel L. Watson, teaming,	138 95
2958	Congdon, Carpenter & Co., steel and bolts,	6 68
2959	Providence Press Co., printing,	101 06
2960	U. H. Scrutton, medical attendance for horse,	15 00
2961	Preston & Spaulding, soap, candles, matches, &c.,	5 88
2962	Waldron, Wightman & Co., soap,	6 80
2963	B. F. Almy, cop waste,	10 00
2964	Albert Weaver, carting cement, (charged to Eiley Brothers,)	6 00
	Amount carried forward,	\$32,333 17

REPORT OF THE WATER COMMISSIONERS. 19

	Amount brought forward,	\$32,333 17
2965	W. S. Fifield, brooms,	18 00
2966	Fales, Jenks & Sons, water gates, repairing meters, &c.,	361 54
2967	W. A. Lovell, bridge across Pawtuxet river, near pumping station,	200 00
2968	Fuller Iron Works, special castings,	45 45
2969	Samuel M. Gray, on account for paying laborers,	300 00
2970	Riley Brothers, on account for felting pipes, boilers, &c., at Pettaconset station,	1,200 00
2971	Willard F. Inman, damage caused by water flowing down Lippitt street, during hydrant test of Hope pumping engine No. 2,	25 00
2972	Charles H. Pierce, salary as assistant engineer,	250 00
2973	Otis F. Clapp, " " " "	208 33
2974	Howard A. Carson, " " " "	250 00
2975	Charles H. Swan, " " " "	208 33
2976	William T. Schneider, " " " "	100 00
2977	John E. Bowen, " " " "	100 00
2978	Lepriele Sweet, 2d, " " " "	83 33
2979	Edmund B. Weston, " " " "	83 33
2980	William M. Brown, Jr., " " " "	83 33
2981	Daniel C. Stone, salary as assistant engineer,	83 33
2982	Edwin P. Dawley, " " " "	83 33
2983	Frank B. Ferris, " " " " &c.,	50 00
2984	Thomas L. Botts, " " " "	50 00
2985	William H. Olmstead, " " " "	45 83
2986	William F. Janes, " " service pipe engineer,	83 33
2987	Augustus F. Nagle, " " mechanical " "	100 00
2988	George B. Francis, " " student, engineering department,	40 28
2989	Charles A. Harper, " " " " "	33 33
2990	Alfred E. Martin, " " " " "	41 67
2991	Albert L. Bodwell, " " " " "	33 33
2992	Walter F. Slade, " " service pipe clerk, engineering department,	83 33
2993	William Aplin, " " clerk, engineering department,	83 33
2994	William H. Turner, " " " " "	100 00
2995	Irvin H. Potter, " " " " "	54 00
2996	Andrew B. Purdy, " " superintendent of pipe work,	168 67
2997	William H. Patterson, " " inspector on pipe line,	100 00
2998	S. Horace Wheeler, " " " of service pipes,	125 00
2999	Henry M. Wilcox, " " assistant inspector of service pipes,	100 00
3000	Frederic A. Arnold, " " inspector of water fixtures,	100 00
3001	Albert C. Winsor, " " assistant inspector of water fixtures,	73 00
3002	Edward A. Moran, " " inspector of meters,	100 00
3003	William Clancy, " " plumber, meter department,	63 75
3004	James H. Higgins, " " " " "	67 50
3005	Alexis C. Miller, " " keeper of Hope reservoir,	77 50
3006	Jeptha Baker, " " " " Sockanosset reservoir,	77 50
3007	Albert E. Angell, " " temporary assistant, engineering department,	47 25
3008	George H. Slade, salary as temporary assistant, engineering department,	50 40
3009	Edward C. Reynolds, salary as temporary assistant, engineering department,	36 00
	Amount carried forward,	\$57,968 47

	Amount brought forward,	\$37,986 47
3010	George W. Winsor, Jr., salary as temporary assistant, engineering department,	36 75
3011	Henry G. Dennis, salary as superintendent of pipe yard,	125 00
3012	Richard M. Wood, " " clerk at pipe yard,	83 33
3013	John Cuthbert, " " pumping engineer, Pettaconset station,	104 17
3014	John Hamilton, salary as pumping engineer, Pettaconset station,	85 00
3015	George F. Barney, salary as fireman, Pettaconset station,	60 00
3016	Patrick O'Rourke, " " " " " "	70 00
3017	John Tallent, " " " " " "	60 00
3018	John Quinn, " " pumping engineer, Hope station,	125 00
3019	Marcus E. Sherman, " " " " " "	100 00
3020	Judson Davis, " " fireman, Hope station,	29 00
3021	John E. Sherman, " " " " " "	17 33
3022	Michael Hamill, salary as fireman, Hope station,	65 00
3023	William F. Tanner, " " axeman,	54 00
3024	Jesse W. Coleman, " " commissioners' clerk,	50 00
3025	Leonard N. Austin, Jr., salary as commissioners' clerk,	75 00
3026	Thomas C. Gushee, " " " " " "	100 00
3027	Philip S. Chase, " " " " " "	150 00
3028	Clinton D. Sellow, salary as secretary of water commissioners,	200 00
3029	John Funnell, " " janitor, &c.,	53 98
3030	Charles H. Pierce, paid by him for sundries,	56 32
3031	" " " " " labor,	1,323 28
3032	Clinton D. Sellow, " " " " sundries,	27 33
3033	E. F. Kimball, calculations for test of Hope engine, No. 2,	339 49
3034	J. H. Harlow, " " " " " "	306 00
3035	Knowles, Anthony & Danielson, advertising,	4 06
3036	Robert Morrow, horse hire by engineer,	21 00
3037	Fairbanks, Brown & Co., scales,	385 05
3038	The Joseph Dixon Crucible Co., perfect lubricator,	122 07
3039	Lawrence Waterbury & Co., jute bands,	27 10
3040	Louis W. Clarke, repairing telegraph lines,	90 63
3041	Abbott Lawrence, expressage on meters,	23 50
3042	Barker, Whitaker & Co., tools, &c.,	55 54
3043	George L. Claffin & Co., quicksilver, mercury, oil, acids, &c.,	46 41
3044	Union Water Meter Co., water meters and repairing,	888 25
3045	Oliver Johnson & Co., keystone and union lead,	24 75
3046	Congdon, Carpenter & Co., steel,	14 80
3047	Samuel M. Gray, engineering services, self and assistants,	301 88
3048	Samuel M. Gray, horse hire and paid by him for sundries,	102 79
3049	American Steam Gauge Co., lubricator, &c.,	83 00
3050	Newport & Providence Lead Works, tin lined lead pipe,	329 83
3051	Faulding, Kemble & Co., on account for constructing pumping engine,	120 00
3052	Thomas J. Hill, rent of wharf and pipe yard,	875 00
3053	Fuller Iron Works, special castings,	164 21
3054	Dexter Gorton & Co., carpenters' work, lumber, &c.,	224 92
3055	Daniel F. Burlingame, repairing tools, &c.,	8 43
3056	Foster S. Dennis, on account of reservation in bill for laying water pipes in 1875,	1,000 00
3057	Samuel M. Gray, on account for paying laborers,	300 00
3058	Tucker, Swan & Co., coal,	92 02
	Amount carried forward,	\$46,840 33

REPORT OF THE WATER COMMISSIONERS. 21

	Amount brought forward,		\$46,840 33
3059	Wood & Winsor, tubing, nipples, &c.,		19 18
3060	Bugbee & Hall, stationery,		64 05
3061	R. S. Burrough & Co., oil,		97 74
3062	Olney Brothers, oil, &c.,		36 91
3063	Newport & Providence Lead Works, lead and lead pipe,		1,352 10
3064	Phenix Iron Foundry, spur wheels,		5 80
3065	Henry T. Root & Co., feather duster, brushes, &c.,		7 00
3066	Richards & Belden, swivel chairs,		12 00
3067	John Chalmers, covering steam and water pipes at Hope engine house,		14 75
3068	Fales, Jenks & Sons, water meters,		389 00
3069	Providence Steam Engine Co., machinists' labor and materials at Pettaconset pumping station,		3,016 87
3070	Paulding, Kemble & Co., on account for constructing pumping engine,		563 70
3071	Charles H. Pierce, on account for paying laborers,		400 00
3072	Architectural Iron Works, on account for roof of engine house and boiler house at Pettaconset,		4,000 00
3073	Samual M. Gray, paid by him for labor,		1,811 68
3074	William E. Taber & Son, clock,		7 00
3075	B. F. Almy, cop waste,		20 00
3076	John Manning, labor and teaming at Pettaconset.		45 10
3077	Samuel L. Watson, teaming at Pettaconset,		105 07
3078	Thomas Phillips & Co., plumbers' labor and materials,		423 37
3079	A. C. Eddy & Studleys, rubber packing and rings,		129 40
3080	Hopkins & Pomroy, coal, cement, teaming, &c.,		768 43
3081	T. & W. Breck, rent of offices, &c.,		877 50
3082	J. W. & J. J. Newman, labor, teaming, &c.,		1,850 18
3083	J. H. Harlow, calculations for test of Hope engine No. 2,		214 65
3084	Providence Press Co., advertising,		9 15
3085	William M. Bender & Co, drain tile,		167 81
3086	Barker, Whitaker & Co., tools, &c.,		135 19
3087	Thomas Phillips & Co., labor and materials.		127 84
3088	Providence Steam Engine Co., machinists' labor and materials at Pettaconset pumping station.		233 28
3089	Providence Tool Co., brass chain,		21 00
3090	Providence Steam and Gas Pipe Co., labor, pipe and fittings,		1,489 45
3091	Samuel M. Gray, on account for paying laborers,		400 00
3092	Paulding, Kemble & Co., on account for constructing pumping engine,		600 00
3093	Riley Brothers, covering boilers and steam pipes at Pettaconset,		177 70
3094	Paulding, Kemble & Co., on account for constructing pumping engine.		6,000 00
3095	" " " " hoisting crab,		250 00
3096	J. Herbert Shedd, salary as chief engineer,		2,000 00
3097	Charles H. Pierce, " assistant engineer,		250 00
3098	Otis F. Clapp, " " " "		208 33
3099	Howard A. Carson salary as assistant engineer,		250 00
3100	Charles H. Swan, " " " "		208 33
3101	William T. Schneider, " " " "		100 00
3102	C. Frank Allen, " " " "		90 00
3103	John E. Bowen, " " " "		100 00
3104	Leprilte Sweet, 2d, " " " "		83 33
3105	Edmund B. Weston, " " " "		83 33
	Amount carried forward,		\$75,555 53

Amount brought forward, . . .		\$75,555 53
3106	William M. Brown, Jr., salary as assistant engineer, . . .	83 33
3107	Daniel C. Stone, " " " " . . .	83 33
3108	Edwin P. Dawley, " " " " . . .	83 33
3109	Frank B. Ferris, " " " " . . .	66 67
3110	Thomas L. Botts, " " " " . . .	66 67
3111	William H. Olmstead, " " " " . . .	66 67
3112	William F. Jones, " " service pipe engineer, . . .	83 33
3113	Augustus F. Nagle, " " mechanical engineer, . . .	100 00
3114	George B. Francis, " " student, engineering department, . . .	41 67
3115	Charles A. Harper, salary as student, engineering department, . . .	33 33
3116	Alfred E. Martin, " " " " . . .	41 67
3117	Albert L. Bodwell, " " " &c., " " . . .	40 86
3118	Walter F. Slade, " " service pipe clerk, engineering department, . . .	83 33
3119	William Applin, salary as clerk, engineering department, . . .	83 33
3120	William H. Turner, " " " " . . .	100 00
3121	Irvin H. Potter, " " " " . . .	58 50
3122	Andrew B. Purdy, " " superintendent of pipe work, . . .	106 67
3123	William H. Patterson, " " inspector on pipe line, . . .	108 00
3124	S Horace Wheeler, " " of service pipes. . . .	125 00
3125	Henry M. Wilcox, " " assistant inspector of service pipes, . . .	100 00
3126	Frederic A. Arnold, " " inspector of water fixtures, . . .	100 00
3127	Albert C. Winsor, " " assistant inspector of water fixtures, . . .	81 00
3128	Edward A. Moran, " " inspector of water meters, . . .	100 00
3129	William Clancey, " " plumber, meter department, . . .	65 00
3130	James H. Higgins, " " " " . . .	65 00
3131	Alexis C. Miller, " " keeper of Hope reservoir, . . .	75 00
3132	Jeptha Baker, " " " " Sockanosset reservoir, . . .	75 00
3133	Albert E. Angell, " " temporary assistant, engineering department, . . .	45 50
3134	George H. Slade, salary as temporary assistant, engineering department, . . .	35 20
3135	Edward C. Reynolds, salary as temporary assistant, engineering department, . . .	37 50
3136	George W. Winsor, Jr., salary as temporary assistant, engineering department, . . .	36 00
3137	Henry G. Dennis, salary as superintendent of pipe yard, . . .	125 00
3138	Richard M. Wood, " " clerk at pipe yard, . . .	83 83
3139	John Cuthbert, salary as pumping engineer, Pettaconset station, . . .	104 17
3140	John Hamilton, " " " " " " . . .	85 00
3141	George F. Barney, salary as fireman, Pettaconset station, . . .	60 00
3142	Patrick O'Rourke, " " " " " " . . .	36 13
3143	John Tallent, " " " " " " . . .	62 00
3144	John Quinn, salary as pumping engineer, &c., Hope station, . . .	150 00
3145	Marcus E. Sherman, salary as " " " " . . .	100 00
3146	William Tierney " " fireman, Hope station, . . .	75 83
3147	Michael Hamill, " " " " " " . . .	65 00
3148	William F. Tanner, " " axeman, . . .	51 00
3149	Jesse W. Coleman, " " commissioners' clerk, . . .	50 00
3150	Leonard N. Austin, Jr., " " " " . . .	75 00
3151	Thomas C. Gushee, " " " " . . .	100 00
3152	Philip S. Chase, " " " " . . .	150 00

Amount carried forward, . . . \$79,358 88

REPORT OF THE WATER COMMISSIONERS. 23

	Amount brought forward,		\$79,258 88
3153	Clinton D. Sellew, salary as secretary of water commissioners,	200 00	
3154	William Corliss, " " water commissioner,	500 00	
3155	Charles E. Carpenter, " " " "	500 00	
3156	Joseph J. Cooke, " " " "	500 00	
3157	John Purnell, " " janitor, &c.,	59 07	
3158	Charles H. Pierce, paid by him for sundries,	75 81	
3159	Charles H. Pierce, paid by him for labor,	1,419 66	
3160	Samuel M. Gray, engineering services, self and assistants,	433 17	
3161	Samuel M. Gray, horse hire, &c.,	98 90	
3162	Steamer Galatea, freight of cement, (charged to Paulding, Kem- ble & Co.,)	8 19	
3163	George W. Smith, cutting stone for hydrant boxes,	12 00	
3164	I. B. Mason, lard,	8 26	
3165	Lawrence Waterbury & Co., jute bands,	25 35	
3166	Rhode Island Concrete Co., concreting around hydrants,	4 50	
3167	William H. Knight, charcoal,	37 05	
3168	Abbott Lawrence, expressage of meters,	27 75	
3169	William H. Miller & Co., tools and repairing,	55 38	
3170	N. D. Thurber, post bolts, sharpening tools, &c.,	20 58	
3171	Union Water Meter Co., water meters and repairing,	1,117 85	
3172	Daniel F. Burlingame, repairing tools, &c.,	43 42	
3173	J. L. Pierce & Co., oil,	90 95	
			<hr/>
			\$84,496 77

REPORT OF THE WATER COMMISSIONERS. 25

TRIAL BALANCE OF LEDGER, MAY 31, 1876.

DR.

Hope reservoir, for land,	.	.	\$117,322 13
" " sundries,	.	.	2,264 77
" " labor,	.	.	6,828 65
" " gate chambers,	.	.	11,571 48
" " gate houses,	.	.	4,185 14
" " drain,	.	.	2,142 39
" " inspection,	.	.	8,614 26
" " conduit,	.	.	3,746 18
" " slope wall,	.	.	43,127 81
" " steps,	.	.	3,103 33
" " iron railing,	.	.	1,562 45
" " fence,	.	.	1,493 25
" " improvement of grounds,	.	.	6,090 20
Hope engine house,	.	.	105,796 86
Sockanosset reservoir, for construction,	.	.	177,870 73
" " sundries,	.	.	124 45
" " land,	.	.	14,138 36
" " gate houses,	.	.	18,641 85
" " gate chambers,	.	.	19,299 27
" " drain,	.	.	3,506 01
" " inspection,	.	.	6,819 18
" " extra work and materials,	.	.	189 70
" " steps,	.	.	3,235 94
" " improvement of grounds,	.	.	13,622 13
Lincoln reservoir, for land,	.	.	2,946 54
Line of leading mains, for labor and materials,	.	.	19,850 30
" " " " extra trenching, etc.,	.	.	473 45
" " " " land and damages,	.	.	1,665 00
Force main line, for land and damages,	.	.	3,006 35
" " " " labor and materials,	.	.	6,509 65
" " " " extra trenching, etc.,	.	.	332 56
Office furniture, stoves, gas fixtures, etc.,	.	.	1,315 91
Rent of offices,	.	.	2,972 22
Books, stationery, etc.,	.	.	660 73
Fuel and lights,	.	.	220 90
Horse hire by commissioners,	.	.	19 00
Traveling expenses of commissioners,	.	.	161 92
Janitor of rooms,	.	.	503 65
Commissioners' salaries,	.	.	22,542 19
Secretary's salary,	.	.	3,055 50
Clerks' salaries,	.	.	4,286 53
Sundries,	.	.	513 81
Printing,	.	.	2,351 29
Advertising,	.	.	1,940 48
Fences,	.	.	2,075 38
Rent of wharves and pipe yards,	.	.	8,067 78
Amount carried forward,	.	.	\$661,396 75

Amount brought forward,	\$681,396 75
Stop valves,	74,498 18
Linking curved pipes,	232 75
Store house and work shop,	1,209 64
Tools,	12,443 45
Labor on pipes	16,685 30
Cast iron water pipes,	1,332,730 34
Special castings,	103,729 37
Lumber,	1,576 30
Fire hydrants,	107,540 46
Sockanosset hill cross road,	3,855 38
Telegraph lines,	2,282 80
Dwelling houses at Pettaconset,	10,095 63
Culverts and bridge on line of force mains,	6,775 33
Culverts at Pettaconset,	3,557 92
Real estate in Warwick,	11,272 28
Water privileges, mill, and other real estate in Pawtuxet,	45,485 90
Pettaconset pumping station, for land,	25,902 41
Pochasset bridge,	5,539 82
Wharf salaries,	12,249 45
Temporary engine house at Pettaconset,	9,832 11
Roads, slopes, etc., at Pettaconset,	12,053 30
Engine house at Pettaconset,	319,190 07
Natural filter basin,	41,518 35
Removing loam,	482 95
Iron screw piles,	3,766 46
Hydrant bolts,	1,940 78
Pipe bolts,	1,933 70
Photographs,	328 25
Hydrant heads,	7,511 51
Taps and stops,	19,567 06
Valve covers,	9,360 34
Service pipe,	52,216 44
Hydrant boxes,	30,191 67
Setting fire hydrants,	10,961 85
Check valves,	3,712 48
Valve boxes,	34,542 58
Air cocks, boxes, covers and setting,	519 52
Setting blow-offs,	331 49
Lobdell & Newmans,	188,025 00
A. & W. Sprague Manufacturing Co.,	2,500 00
Samuel M. Gray,	400 00
Paulding, Kemble & Co.,	117,896 79
R. O. Peck,	147 00
James Glass,	4,706 30
Providence Steam Engine Co.,	52,063 10
Rhode Island Locomotive Works,	30,198 21
Architectural Iron Works,	39,522 75
French, Mackenzie & Co.,	3,150 00
Builders' Iron Foundry,	7 41
City of Providence, sewer department,	7 00
Sewer department, salaries and office expenses,	711 34
City Treasurer,	298,449 31
City Treasurer, for water payments,	568,134 15
Testing pipe iron,	443 50
Amount carried forward,	\$4,293,426 23

REPORT OF THE WATER COMMISSIONERS. 27

Amount brought forward,	\$4,295,426 23
Iron drain pipes and gate,	224 21
Carting pipes,	40,682 71
Counsel fees,	5,500 00
Inspection of pipes,	10,312 23
Testing bolts and composition castings,	34 25
Laying water pipes,	406,808 18
Laying service pipes,	33,443 25
Laying suction pipe, etc.,	85 00
Drainage pump and engine,	5,164 84
Hydrants for street sprinklers,	2,639 50
Inspection of pipe laying,	35,409 64
Temporary boarding house at Pettaconset,	1,434 34
Public drinking fountains and troughs,	2,724 78
Warwick test pits,	1,313 40
Engine house at Pettaconset, for drain,	2,132 37
Water meters set, belonging to the city,	1,898 72
Worthington pumping engine,	35,522 33
Hope pumping engine,	63,139 92
Cornish pumping engine,	16,142 76
Keeper's house at Sockanosset reservoir,	7,088 84
Pipe in river embankment at Pettaconset,	4,067 82
Inspection of engine work,	5,287 08
Alterations at Hope pumping station, for second engine,	784 59
Testing second engine at Hope pumping station,	6,434 20
Hope pumping engine No. 2,	35 37
Drain tiles,	657 35
Boilers for Cornish engine,	12,740 93
Stand pipe at Pettaconset,	1,719 87
Bridge at Pettaconset,	215 75
	<hr/> \$5,003,019 34

ENGINEERING DEPARTMENT:—

For instruments,	3,494 41
Tools,	741 27
Furniture, stoves, gas fixtures, etc.,	2,923 45
Draughting,	3,523 52
Labor,	10,323 53
Horse and wagon account,	2,832 26
Horse keeping, shoeing, etc.,	3,088 44
Horse hire,	5,835 65
Rent of offices,	7,276 32
Fuel and lights,	791 47
Janitor of rooms,	1,347 03
Experimental filter,	91 08
Books, stationery, etc.,	3,702 85
Sundries,	3,869 88
Test wells,	1,579 40
Consultations,	827 08
Office building at Pettaconset,	567 60
Office building at Sockanosset reservoir,	563 22
Stakes and strips,	1,322 79
Printing,	684 78
Maps,	179 17
Service pipe experiments,	286 04
Temporary assistance,	11,656 93
Salaries,	107,387 05
	<hr/> \$174,905 27

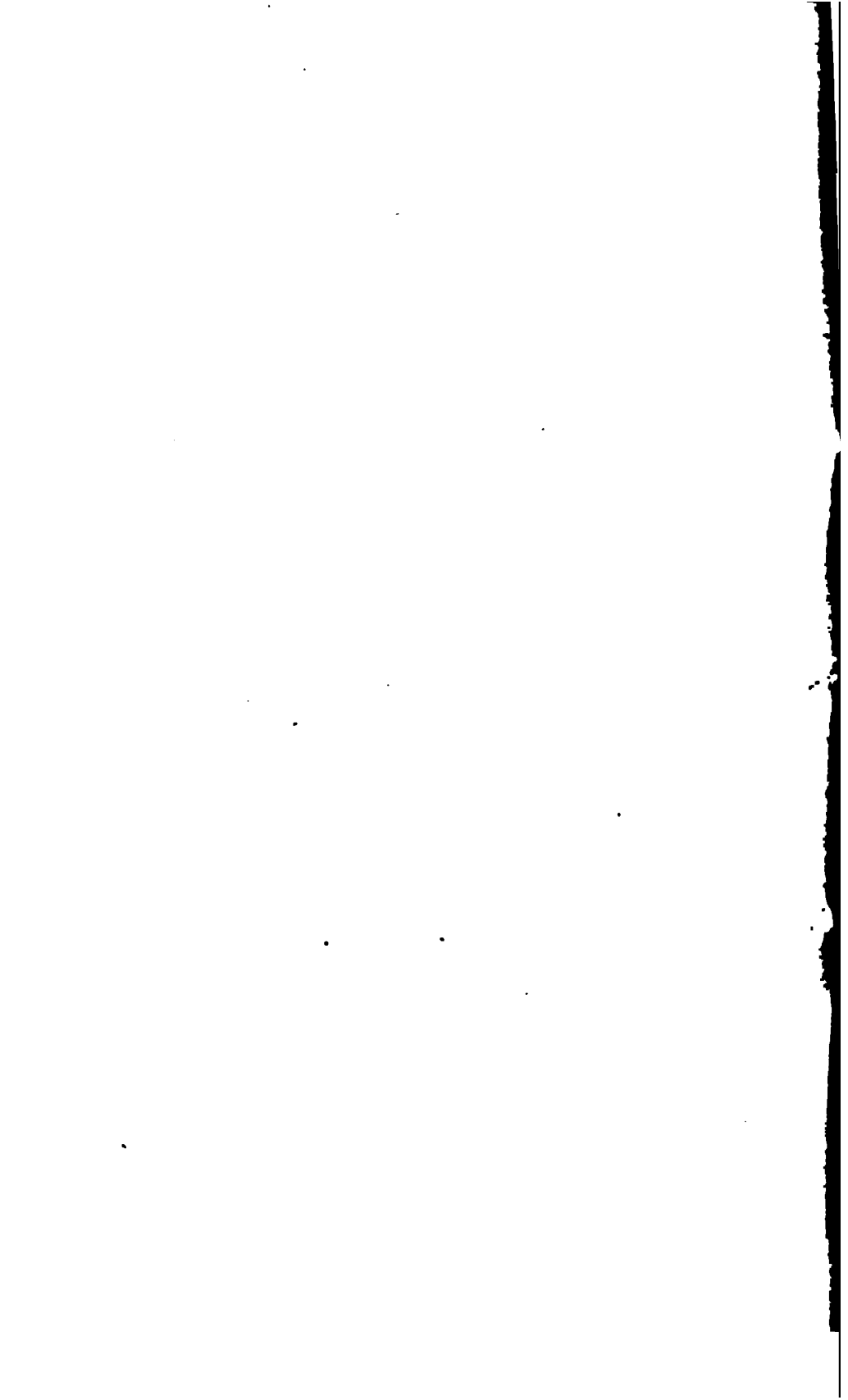
Amount carried forward, \$5,177,924 61

Amount brought forward,		\$5,177,924 61
MAINTENANCE:—		
Hope pumping station, for coal and wood,	9,413 96	
“ “ “ “ engineers,	5,158 36	
“ “ “ “ firemen,	3,036 81	
“ “ “ “ lights,	2,100 34	
“ “ “ “ sundries,	954 51	
“ “ “ “ night and Sunday watch,	41 23	
“ “ “ “ labor on fuel,	8 06	
Pettaconset pumping station, for coal and wood,	33,446 26	
“ “ “ “ engineers,	8,002 20	
“ “ “ “ firemen,	7,348 83	
“ “ “ “ labor on fuel,	3 549 64	
“ “ “ “ sundries,	6,087 36	
“ “ “ “ night and Sunday watch,	3,189 33	
Sockanosset reservoir, for watch,	4,014 25	
“ “ “ “ sundries,	7,992 71	
Hope reservoir, for watch,	820 00	
“ “ “ “ sundries,	227 96	
Ascertaining and removing nuisances on Pawtuxet river,	479 46	
Worthington pumping engine,	8,206 94	
Hope pumping engine,	398 25	
Hope pumping engine, No. 2,	13 78	
Miller boilers at Pettaconset,	142 36	
Change of grades,	2,267 81	
Inspection of water fixtures,	6,275 33	
Repairs on pipe line,	10,090 53	
Meter testing room,	270 91	
Setting, inspection and repair of meters,	1,023 05	
Commissioners' salaries,	8,833 40	
Secretary's salary,	3,035 63	
Clerks' salaries,	7,206 69	
Rent of offices,	1,506 70	
Fuel and lights,	70 51	
Janitor of rooms,	300 63	
Books, stationery, etc.,	689 82	
Printing,	790 31	
Advertising,	91 52	
Sundries,	414 80	
Counsel fees,	1,000 00	
Thawing pipes, gates, etc.,	1,204 82	
Supplying water takers by reason of frost,	1,290 38	
Engineering department, for rent of offices,	3,125 40	
“ “ “ “ fuel and lights,	158 71	
“ “ “ “ janitor of rooms,	612 73	
“ “ “ “ books, stationery, etc.,	221 55	
“ “ “ “ printing,	214 56	
“ “ “ “ salaries,	18,646 03	
“ “ “ “ sundries,	35 27	
		174,092 76
CR.		\$5,352,017 37
Foster S. Dennis,	550 00	
Boston hydrants,	29 07	
Water meters,	1,370 37	
Penalties,	516 00	
Water,	568,134 15	
Approved bills,	4,781,417 78	
		\$5,352,017 37

REPORT OF THE WATER COMMISSIONERS. 29

SCHEDULE OF RECEIPTS FOR WATER, BY MONTHS, FROM COMMENCEMENT TO MAY 31, 1876, INCLUSIVE.

MONTHS.	1872.	1873.	1874.	1875.	1876.
January.....		\$40,899 09	\$69,356 70	\$92,102 10	\$106,847 71
February.....	\$796 06	4,314 80	3,678 96	4,674 19	2,989 71
March.....	6,671 82	6,669 73	9,321 19	4,777 42	6,777 07
April.....	1,668 59	2,810 07	4,986 98	10,098 82	13,384 63
May.....	2,068 41	1,766 28	2,338 59	2,574 92	2,598 33
June.....	8,684 80	8,228 92	2,533 35	8,140 90	.. .....
July.....	3,488 27	6,214 24	13,756 51	9,085 23	.....
August.....	1,818 14	1,441 09	1,953 37	4,001 66	.....
September.....	4,933 44	7,550 64	5,541 34	5,398 34	.....
October.....	5,079 08	8,745 53	9,097 95	13,578 46	.....
November.....	477 04	873 83	1,511 03	1,291 59	.....
December.....	5,372 77	8,072 87	8,076 42	9,481 49	.....
	\$41,003 51	\$97,386 09	\$182,052 39	\$166,144 71	\$182,847 45



1876.]

CITY DOCUMENT.

[No

TENTH QUARTERLY REPORT
OF THE BOARD OF
WATER COMMISSIONERS
OF THE
CITY OF PROVIDENCE,

[Elected February 27, 1874.]

SEPTEMBER 1, 1876.



PROVIDENCE:
PROVIDENCE PRESS COMPANY, PRINTERS TO THE CITY.
1876.

1876.]

CITY DOCUMENT.

[No. 38.]

TENTH QUARTERLY REPORT

OF THE BOARD OF

WATER COMMISSIONERS

OF THE

CITY OF PROVIDENCE.

[Elected February 27, 1874.]

SEPTEMBER 1, 1876.



PROVIDENCE:

PROVIDENCE PRESS COMPANY, PRINTERS TO THE CITY.

1876.



ORGANIZATION
OF THE
PROVIDENCE WATER WORKS.

BOARD OF WATER COMMISSIONERS.

JOSEPH J. COOKE, PRESIDENT.
CHARLES E. CARPENTER,
WILLIAM CORLISS.

SECRETARY OF THE BOARD OF WATER COMMISSIONERS.

CLINTON D. SELLEW.

Office No. 35 North Main Street.

CHIEF ENGINEER.

J. HERBERT SHEDD.

Office No. 35 North Main Street.



REPORT.

OFFICE OF THE BOARD OF WATER COMMISSIONERS, }
Providence, R. I., September 1, 1876. }

TO THE HONORABLE THE CITY COUNCIL :—

The undersigned Water Commissioners, elected February 27th, 1874, under "An Ordinance to establish a Board of Water Commissioners," approved same day, respectfully present their Tenth Quarterly Report:

On the 12th day of July last the Commissioners were informed by telegraph of the death by drowning, on the previous day at Nantucket, of Lucius J. Sampson, Engineer of Private Drains, who was absent on a vacation. Mr. Sampson commenced on the Water Works as a student and was highly respected.

A contract has been executed with McNeals & Archer, of Burlington, New Jersey, for furnishing seventy-five (75) tons of cast iron water pipes, twelve (12) inches in diameter; and one hundred and twenty-five (125) tons, eight (8) inches in diameter, delivered on wharf in this city, for thirty-three $\frac{75}{100}$ (33.75) dollars per ton of 2240 pounds.

A contract has been executed with McNeals & Archer, of Burlington, New Jersey, for furnishing five hundred (500)

tons of six (6) inch cast iron water pipes delivered on wharf in this city, for thirty-three $\frac{75}{100}$ (33.75) dollars per ton of 2240 pounds.

An offer of the Newport & Providence Lead Works to furnish ten (10) gross tons lead pipe, at eight $\frac{55}{100}$ (8.55) cents per pound and ten (10) gross tons "Omaha" lead at six $\frac{90}{100}$ (6.90) cents per pound, delivered in this city, has been accepted.

An offer of Hopkins & Pomroy to furnish Lehigh chestnut coal for the term of one year, delivered at Pettaconset pumping station, at five $\frac{60}{100}$ (5.60) dollars per ton, with stove coal, delivered at Hope pumping station, at six $\frac{30}{100}$ (6.30) dollars per ton, with egg coal at same place, at five $\frac{55}{100}$ (5.55) dollars per ton, has been accepted.

The Engine House at Pettaconset is completed with the exception of surfacing the floor and base with concrete.

The Cornish Engine at Pettaconset is working satisfactorily.

The railing around Hope Reservoir is completed with the exception of painting.

The fence on the street lines of Hope Reservoir grounds is in process of erection.

The daily consumption of water, including waste and leakage, during the last quarter was about 3,300,000 gallons.

Plumbers' licenses have been issued as follows :

Samuel N. Bryant,

James C. Conroy,

Job S. Fuller.

The whole number of plumbers' licenses issued is sixty-nine. Suspended, three. Revoked, one. Surrendered, one. Remaining in force, sixty-four.

REPORT OF THE WATER COMMISSIONERS. 7

The following statement shows the length of pipes laid during the last quarter; the sizes of the pipes; where laid, and the totals since the commencement of the work:

16 INCH.

In Charles street,	-	-	-	-	625 feet.
Including 2 cut pipes, 3 branches and 1 gate.					
Previously,	-	-	-	-	24,044 feet.
Total,	-	-	-	-	<u>24,669 feet.</u>

12 INCH.

In Atwell's and Manton avenues and Cranston street, Cranston,	-	-	-	-	2,899 feet.
Including 13 cut pipes, 15 curved pipes, 15 branches and three gates.					
Previously,	-	-	-	-	32,298 feet.
Total,	-	-	-	-	<u>35,197 feet.</u>

8 INCH.

In Admiral, Eaton, North and Smith streets, and in Butler, Douglas and Oakland avenues,					9,186 feet.
Including 20 cut pipes, 13 curved pipes, 33 branches and 15 gates.					
Previously,	-	-	-	-	78,822 feet.
Total,	-	-	-	-	<u>88,008 feet.</u>

6 INCH.

In Amherst, Bernon, Brown, Fillmore, Gesler, Lippitt, Lloyd, Manning, Mawney, Merrill, Oakland, Peace, Power, Tefft, Transit, Violet and Washburne streets; in Chalkstone avenue; in Swan Point road, and in

Oliver street, Johnston, -	-	-	11,615 feet.
Including 39 cut pipes, 31 curved pipes, 25 branches and 23 gates.			
Previously, -	-	-	415,119 feet.
<hr/>			
Total, -	-	-	426,734 feet.
<hr/>			
Total of all sizes during the last quarter, -	-	-	24,325 feet.
or $4\frac{607}{1000}$ miles.			
Previously, including 10, 20, 24, 30 and 36 inch, of which none have been laid during the last quarter, -	-	-	660,067 feet.
<hr/>			
Total, -	-	-	684,392 feet.
or $129\frac{619}{1000}$ miles.			

Twenty-six fire hydrants have been set during the last quarter, one in each of the following locations; the one marked * being in Johnston :

Admiral street, north-east corner of Hawkins street.

Admiral street, north side, opposite east line of Newcomb street,

Admiral street, north side, about 180 feet west of Mowry street.

Atwell's avenue, north side, 50 feet east of Woonasquatucket river.

Butler avenue, south-east corner of North street.

Charles street, west side, 55 feet north of north line of Clark street.

Charles street, west side, 283 feet south of south line of Clark street.

Douglas avenue, east side, opposite south line of Sherman street.

Douglas avenue, north-east corner of Eagle Park street.

Fillmore street, north-west corner of Mathew street.

Gesler street, south side, opposite west line of street first west of Courtland street.

REPORT OF THE WATER COMMISSIONERS. 9

Lippitt street, north side, opposite west line of Riley street.

Lippitt street, north side, about 480 feet west of Camp street.

Manton avenue, south side, opposite west line of Erastus street.

Mawney street, north side, about 150 feet west of Greenwich street.

Oakland avenue, north-west corner of Smith street.

Oakland avenue, west side, opposite south line of Sarah street.

Oakland street, south side, about 165 feet west of Greenwich street.

Oakland street, south side, about 250 feet east of Potter's avenue.

*Oliver street, north-east corner of Waterman street.

Peace street, south side, 408 feet east of Broad street.

Peace street, south side, 290 feet west of Prairie avenue.

Smith street, south-east corner of Clara street.

Swan Point road, east side, 60 feet north of entrance to Swan Point Cemetery.

Tefft street, south-east corner of Cedar street.

Violet street, east side, about 300 feet north of Orms street.

The hydrant corner of Hope and Lloyd streets has been moved to the north-west corner of Lloyd and Brook streets.

The total number of fire hydrants is now nine hundred and seventy-six.

The height of water in Sockanosset Reservoir at 7 o'clock this morning was 171.36. High water in the reservoir is 180.50, (above high tide in Providence river.)

The height of water in Hope Reservoir at 7 o'clock this morning was 162.80. High water in the reservoir is 162.50, (above high tide in Providence river.)

Seventy-seven Ball & Fitts' water meters, made by the Union Water Meter Co., and forty-five water meters made by

Fales, Jenks & Sons, have been put in at the expense of water takers since the date of the last report. Two two-inch water meters, made by Fales, Jenks & Sons, have been set at the expense of the city. Fifty-three five-eighths inch water meters, made by Fales, Jenks & Sons, have been substituted for three-quarter inch meters of the same make, and one five-eighths-inch Ball & Fitts' water meter has been substituted for a five-eighths-inch Worthington water meter.

There are now twenty-six hundred and forty-seven water meters in use, viz. :

KIND.	SIZES.							TOTALS.
	$\frac{3}{4}$ inch.	$\frac{1}{2}$ inch.	1 inch.	$1\frac{1}{4}$ inch.	2 inch.	3 inch.	4 inch.	
Ball & Fitts.....	1,538	257	87	45	9	1	1	1,938
Worthington.....	167						1	168
Fales, Jenks & Sons.	102	401	25	2	11			541
	1,807	658	112	47	20	1	2	2,647

The total number of applications for a supply of water is seventy-five hundred and eighty-six.

The number of service stops opened during the last quarter is four hundred.

The number of service stops opened to date is sixty-six hundred and fifty-seven.

Ten stops have been closed during the last quarter for non-payment of bills, four of which have been re-opened on payment of bills and a penalty in each case of two dollars. Fifteen stops previously closed for non-payment have been re-opened during the last quarter; in fourteen cases the bill and penalty of two dollars each, were paid, and the remain-

ing one for reason of attendant circumstances, was re-opened on payment of bill without penalty. One stop previously closed for non-payment has been removed. Fifty-four stops closed for non-payment remain unopened. Five stops have been permanently closed. There are now in use sixty-four hundred and thirty stops.

Water is now supplied for the following uses :—

4 armories ; 11 bakeries ; 37 banks ; 119 bar-rooms ; 2 bath-houses ; 1 bath-house, Turkish ; 117 boarding-houses ; 10 bottling establishments ; 46 building purposes ; 2 burying grounds ; 1 burnisher ; 2 car houses ; 2 carriage depositories ; 3 chasers ; 1 Christian Union ; 32 churches ; 1 city barn ; 2 city bridges ; 1 city building ; 14 city drinking fountains ; 30 city drinking troughs ; 976 city fire hydrants ; 5 city fire steamer stations ; 10 city hose stations ; 10 club rooms ; 14 coal yards ; 1 college ; 1 colored shelter ; 1 conservatory of music ; 4 convents ; 2 court houses ; 1 decorator ; 1 Dexter asylum ; 2621 dwellings of one family ; 2876 dwellings of two families ; 261 dwellings of three families ; 335 dwellings of four families ; 40 dwellings of five families ; 61 dwellings of six families ; 5 dwellings of seven families ; 7 dwellings of eight families ; 1 dwelling of nine families ; 1 dwelling of twelve families ; 2 dye houses ; 12 elevators ; 1 engine turner ; 5 engravers ; 2 enamel works ; 1 express carriage house ; 56 fire supplies, private ; 63 fountains, private ; 1 fountain, public ; 1 furrier ; 3450 garden and street hydrants ; 4 gas holders ; 6 gold and silver refiners ; 5 gold and silver platers ; 1 grain elevator ; 51 green houses ; 22 halls ; 1 home for aged women ; 1 home for aged men ; 2 hospitals ; 18 hotels ; 1 infirmary ; 5 laundries ; 3 libraries ; 1 lithographer ; 23 lodging houses ; 2 lumber dealers ; 1 mason. *Manufacturing establishments*, —2 beer ; 2 belt and picker ; 3 blank book ; 2 bleacheries ; 1 bologna sausage ; 1 bonnet bleachery ; 2 boot and shoe ; 2 box ; 1 braiding works ; 3 brass foundries ; 2 breweries ; 1 brush ; 2 butt ; 9 carriage ; 2 cement pipe ; 1 chain ; 1 chemi-

cal; 6 cigar; 1 cigar box; 20 cloak and dress; 1 coffin; 8 confectionery; 1 corset; 3 colorers of jewelry; 9 cotton; 1 crocus; 1 cutlery; 3 die sinkers; 2 dye wood; 1 emery wheel; 1 enameler of jewelry; 1 eyelet; 3 file; 9 furniture; 1 gas; 1 gas burner; 4 gas fixtures; 1 gas stove; 1 geer; 3 hat; 6 harness; 3 ice cream and soda water; 1 iron company; 1 iron fence; 10 iron foundries; 1 Japan switch; 1 jewelers' cards; 98 jewelry; 4 lapidaries; 29 machinists; 1 mowing machine; 1 nail keg; 2 oil; 1 organ; 1 paper box; 1 paper collar; 3 paper cop tube; 1 pattern; 4 patent medicines; 1 pencil case; 4 picture frame; 2 paint works; 2 pump; 2 reed; 1 rubber goods; 1 rubber tubing; 5 sash and blind; 1 saw; 2 screw; 1 sheet iron; 1 shell comb; 2 shirt; 3 silver ware; 6 soap; 1 spiral spring; 1 starch; 1 steam boiler; 2 steam engine; 1 stencil plate; 1 stove; 2 tanners; 2 thread; 1 tinware; 4 tool; 2 top roll; 6 woolen goods; 1 yeast. *Markets*,—50 fish; 121 meat. *Mills*,—2 drug and grain; 3 flour and grain; 10 planing. 1 nickel plater; 1 opera house; 2 orphan asylums; 9 organs; 5 oyster houses; 624 offices; 11 photographers; 10 printing establishments; 8 plaster and stucco workers; 16 plumbers; 12 provision curers and packers; 6 police stations; 7 railroads; 2 reading rooms; 43 restaurants; 1 roofer. *Saloons*,—5 billiards; 3 bowling; 6 ice cream; 27 lager beer; 9 oyster. *Schools*,—1 boarding; 14 private; 38 public; 1 reform. *Shops*,—51 barber; 10 blacksmiths; 1 carpenter; 4 cooper; 2 gunsmith; 1 junk; 19 paint; 11 shoemaker; 25 tailor; 5 tinman. *Stables*,—6 hack; 49 livery; 328 private; 5 sale; 77 work. 13 steamboats; 13 steamships; 6 steam and gas pipe fitters. *Stores*,—1 agricultural implements; 46 apothecary; 1 auction; 4 book; 34 boot and shoe; 2 carpet; 2 carriage trimmings; 10 cigar; 24 clothing; 14 confectionery; 1 crockery; 3 drug; 42 dry goods; 82 fancy goods; 11 flour and grain; 12 fruit; 11 furniture; 10 gents' furnishing goods; 153 grocery, retail; 15 grocery, wholesale; 11 hardware; 2 hide and leather; 2 hoop skirt; 11 house furnishing goods; 4 house paper; 3 iron and

REPORT OF THE WATER COMMISSIONERS. 13

steel; 15 jewelry; 14 liquor; 1 lime and brick; 2 manufacturers' supplies; 33 millinery; 10 newspaper; 4 oil and paint; 2 paper and paper stock; 2 piano forte; 9 produce, wholesale; 4 sewing machines; 5 stationery; 2 stove; 6 tea; 2 trunk; 1 toy; 1 umbrella; 2 wooden ware; 1 wool; 2 woolen goods. 1 State prison; 1 store house; 6 stone cutters; 1 theatre; 4 undertakers; 1 United States Custom house building; 3 upholsterers; 2 water boats; 1 wheelwright; 1 woodturner; 6 wood yards; 30 not classed.

The amount of expenditures during the last quarter is - - - - \$123,135 59

The total amount of expenditures, is - 4,904,553 37

The total amount of appropriations, is - 4,900,000 00

Bills approved in excess of appropriations, 4,553 37

The cost of construction to date, (deducting from the whole amount of approved bills, the cost of maintenance; the amounts received for labor and materials, etc.; meters; from sewer department for office expenses; estimated amount due from sewer department for engineering, etc.; and adding amounts to the credit of Boston hydrants and water meters,) is - 4,414,517 04

The cost of maintenance to date, is - 190,854 14

The amount received for the last quarter, all of which has been paid to the City Treasurer, is

For water supplies, - - \$22,887 39

For water meters, - - 3,165 30

For penalties, - - 36 00

For sundries, - - 6,857 60

32,946 29

The amount received for water in 1872, was 41,003 51

The amount received for water in 1873, was 97,386 09

The amount received for water in 1874, was 132,052 39

The amount received for water in 1875, was 165,144 71'

The amount received for water during eight
months of 1876, was - - 155,434 84
The total amount received for water to date, is 591,021 54
The amount of all receipts to date, is - 889,529 75

A schedule of bills approved during the last quarter, and of receipts during the same time, a trial balance of ledger, August 31, 1876, and a schedule of receipts for water by months are hereunto appended and made parts of this report.

A separate report of that portion of the duties of the Board which relates to sewers will be presented.

JOSEPH J. COOKE,	}	<i>Board of Water Commissioners.</i>
CHAS. E. CARPENTER,		
WILLIAM CORLISS,		

REPORT OF THE WATER COMMISSIONERS. 15

SCHEDULE OF BILLS APPROVED BY THE BOARD OF WATER COMMISSIONERS, FROM JUNE 1, 1876, TO AUGUST 31, 1876, INCLUSIVE.

3174	Robert Morrow, horse hire by engineers,	\$36 00
3175	Lobdell & Newmans, balance of reservations for constructing Hope reservoir,	9,262 94
3176	Lobdell & Newmans, extra labor, &c., at Hope reservoir,	148 74
3177	Lobdell & Newmans, labor, &c., in full for all claims arising in the construction of Hope reservoir,	11,671 55
3178	Charles H. Pierce, on account for paying laborers,	500 00
3179	Foster S. Dennis, balance of reservation in bill for laying water pipes in 1875,	548 25
3180	Burrows Chace, services as mason and inspector at Hope reservoir grounds,	60 00
3181	Newport & Providence Lead Works, lead and lead pipe,	1,565 99
3182	N. D. Thurber, sharpening tools, &c.,	8 29
3183	Fales, Jenks & Sons, water meters,	389 00
3184	Fales, Jenks & Sons, fire hydrants, hydrant boxes and covers, taps and stops, &c.,	10,917 06
3185	A. W. Page, tallow,	22 21
3186	James Glass, on account for slating roof of engine house at Pettaconset,	91 01
3187	Smith Granite Co., granite,	125 00
3188	Samuel L. Watson, teaming at Pettaconset,	139 50
3189	Samuel M. Gray, for paying laborers, &c.,	1,797 33
3190	Samuel M. Gray, on account for paying laborers,	500 00
3191	Rice, Draper & Co., lawn dressing,	8 65
3192	Oliver Johnson & Co., glass, putty, red lead, white lead, &c.,	7 98
3193	W. S. Fifield, brooms,	9 00
3194	Harrison Hullett, painting at Hope pumping station,	198 47
3195	Olney Brothers, oil,	12 00
3196	William H. Miller & Co. sharpening tools, &c.,	27 97
3197	Louis W. Clarke, repairs on telegraph lines,	46 25
3198	J. W. & J. J. Newman, labor, teaming &c.,	4,567 53
3199	Dexter Gorton & Co., carpenter's work, lumber, &c.,	1,416 73
3200	Foster S. Dennis, in full for all claims under contract for laying water pipes in 1875, (approved as advised by the City Solicitor,)	1,000 00
3201	Wood & Winsor, tubing, couplings, valves, &c.,	47 18
3202	George W. Himes, town of Lincoln tax for 1875, on reservoir land,	8 00
3203	Patrick J. Kilkeenny, on account for plastering engine house at Pettaconset,	200 00
3204	Daniel Smith, carrying laborers to and from work near Swan Point Cemetery,	52 50
3205	Hopkins & Pomroy, coal, cement, teaming, &c.,	637 93
3206	G. & C. P. Hutchins, lanterns, lantern globes, wicks, &c.,	38 01
3207	Barker, Whitaker & Co., tools, &c.,	245 18
3208	Providence Press Co., printing,	37 04
3209	Mason, Chapin & Co., oil, alcohol, &c.,	127 41
3210	William H. Fenner & Co., tallow pot, oil catchers, oil cans, &c.,	31 10
3211	Thomas Phillips & Co., sheet lead, lead pipe, &c.,	535 97

Amount carried forward, . . . \$47,033 36

	Amount brought forward,	\$47,083 36
3212	Proprietors of Locks and Canals on Merrimack river, calculations for test of Hope engine No. 2,	486 40
3213	Paulding, Kemble & Co., on account for constructing pumping engine,	3,000 00
3214	A. C. Eddy & Studleys, hose and couplings, packing rings, &c.,	73 88
3215	Samuel M. Gray, on account for paying laborers,	200 00
3216	Bugbee & Hall, blank books and stationery,	161 87
3217	Charles H. Pierce, salary as assistant engineer,	250 00
3218	Otis F. Clapp, " " " "	208 33
3219	Howard A. Carson, " " " "	250 00
3220	Charles H. Swan, " " " "	208 33
3221	William T. Schneider, " " " "	100 00
3222	John E. Bowen, " " " "	100 00
3223	Lepriete Sweet, 2d, " " " "	83 33
3224	Edmund B. Weston, " " " "	83 33
3225	William M. Brown, Jr., " " " "	83 33
3226	Daniel C. Stone, " " " "	83 33
3227	Edwin P. Dawley, " " " "	83 33
3228	Frank B. Ferris, " " " "	66 67
3229	Thomas L. Botts, " " " "	66 67
3230	William H. Olmsted, " " " "	66 67
3231	Albert L. Bodwell, " " " "	66 67
3233	William F. Janes, " " service pipe engineer,	83 33
3233	Augustus F. Nagle, " " mechanical "	100 00
3234	George B. Francis, " " student, engineering department,	41 67
3235	Charles A. Harper, " " " " "	36 67
3236	Alfred E. Martin, " " " " "	41 67
3237	Walter F. Slade, " " service pipe clerk, engineering department,	83 33
3238	William Aplin, " " clerk, engineering department,	83 33
3239	William H. Turner, " " " " "	100 00
3240	Irvin H. Potter, " " " " "	56 80
3241	Andrew B. Purdy, " " superintendent of pipe work,	166 67
3242	William H. Patterson, " " inspector on pipe line,	104 00
3243	S. Horace Wheeler, " " " of service pipes,	125 00
3244	Henry M. Wilcox, " " assistant inspector of service pipes,	100 00
3245	Frederic A. Arnold, " " inspector of water fixtures,	100 00
3246	Albert C. Winsor, " " assistant inspector of water fixtures,	78 00
3247	Edward A. Moran, " " inspector of water meters,	100 00
3248	William Clancey, " " plumber, meter department,	61 25
3249	James H. Higgins, " " " " "	61 25
3250	Alexis C. Miller, " " keeper of Hope reservoir,	77 50
3251	Jeptha Baker, " " " " Sockanosset reservoir,	77 50
3252	Albert E. Angell, salary as temporary assistant, engineering department,	45 50
3253	George H. Slade, salary as temporary assistant, engineering department,	52 00
3254	Edward C. Keynolds, salary as temporary assistant, engineering department,	39 00
3255	George W. Winsor, Jr., salary as temporary assistant, engineering department,	38 25
3256	Henry G. Dennis, salary as superintendent of pipe yard,	125 00
3257	Richard M. Wood, salary as clerk at pipe yard,	83 33

Amount carried forward, . . . \$54,898 25

REPORT OF THE WATER COMMISSIONERS. 17

	Amount brought forward.	\$54,886 25
3258	John Cuthbert, salary as pumping engineer, Pettaconset station,	104 17
3259	John Hamilton, " " " " " "	85 00
3260	George F. Barney, salary as fireman, Pettaconset station,	60 00
3261	John Tallent, " " " " " "	60 00
3262	John Quinn, " " pumping engineer, Hope station,	125 00
3263	Marcus E. Sherman, " " " " " "	100 00
3264	Michael Hamill, " " fireman, Hope station, "	65 00
3265	Judson Davis, " " " " " "	21 87
3266	William Tierney, " " " " " "	43 83
3267	William F. Tanner, " " axeman,	51 00
3268	Burrows Chase, salary as mason and inspector at Hope reservoir,	60 00
3269	James Dalgleish, salary as mason at Hope reservoir,	90 00
3270	Michael Hunt, " " " " " "	10 50
3271	Jesse W. Coleman, " " commissioners' clerk,	50 00
3272	Leonard N. Austin, Jr., " " " " "	75 00
3273	Thomas C. Gushee, " " " " "	100 00
3274	Phillip S. Chase, " " " " "	150 00
3275	Clinton D. Sellew, " " secretary of water commissioners,	200 00
3276	John Purnell, " " janitor, &c.,	56 23
3277	George B. Francis, services on account of accident to Simeon Noel, (one-half charged to Paulding, Kemble & Co.,)	8 00
3278	Charles H. Pierce, paid by him for labor,	1,528 04
3279	Abbott Lawrence, expressage on meters,	27 55
3280	Newport Manufacturing Co., couplings,	14 07
3281	W. J. Glover, asbestos packing,	5 25
3282	N. Webber, rubber boots,	6 50
3283	John West, services as consulting and superintending engineer,	400 00
3284	Charles H. Pierce, paid by him for sundries,	46 77
3285	Samuel M. Gray, engineering services, self and assistants,	328 04
3286	Samuel M. Gray, horse hire and sundries,	140 45
3287	Robert Morrow, horse hire by engineers,	21 00
3288	Providence Gas Co., gas,	262 92
3289	H. B. Bowen, hydrant bolts,	65 23
3290	Chadwick & Higson, oil, meal, &c.,	10 70
3291	Akerman & Co., blank books,	63 01
3292	Union Water Meter Co., water meters and repairing,	1,018 00
3293	Patrick J. Kilkenney, on account for plastering engine house at Pettaconset,	300 00
3294	Stone & Carpenter, architectural services,	90 00
3295	Daniel F. Burlingame, repairing tools, &c.,	14 82
3296	Henry Holden, horse shoeing,	8 88
3297	Tucker, Swan & Co., coal,	948 32
3298	Newport & Providence Lead Works, lead and lead pipe,	1,100 50
3299	Tuttle & Hobbs, horse keeping, &c.,	234 85
3300	Thomas Phillips & Co., sheet lead, &c.,	52 15
3301	Louis W. Clarke, constructing telegraph line to Hope station, &c.,	813 75
3302	Leonard & Ellis, oil,	249 53
3303	Hopkins & Lyon, horse shoeing,	10 15
3304	Providence Press Co., advertising,	6 40
3305	John H. Appleton, analyses of water,	185 40
3306	T. D. Plimpton, calculations for test of Hope engine No. 2,	22 94
3307	Barker, Whitaker & Co., tools, &c.,	128 59
3308	Samuel L. Watson, teaming at Pettaconset,	156 80
3309	Samuel M. Gray, for paying laborers, &c.,	1,242 42
3310	Fuller Iron Works, special castings, valve boxes, &c.,	1,311 99

Amount carried forward, . . . \$66,737 28

	Amount brought forward,		\$66,737 28
3311	Charles H. Pierce, on account for paying laborers,		400 00
3312	George B. Earle, Trustee, hack hire, test of Hope engine No. 2,		110 05
3313	Hopkins & Pomroy, coal, cement, teaming, &c.,		535 91
3314	Covington & Howland, covering flat portion of boiler house at Pettaconset with Warren's roofing,		214 74
3315	Samuel M. Gray, on account for paying laborers,		300 00
3316	John H. Eddy & Co, sundries,		18 28
3317	Fales, Jenks & Sons, water meters,		389 40
3318	Builders' Iron Foundry, on account for cast iron curbings, window frames, &c., for engine house at Pettaconset,		2,040 00
3319	Fuller Iron Works, special castings, valve boxes, &c.,		1,636 21
3320	P. J. Kilkenney, plastering engine house at Pettaconset.		194 19
3321	Fales & Pepper, repairing wagon,		23 03
3322	G. W. Edmunds, " " "		25 41
3323	Fales, Jenks & Sons, hydrant valves, &c.,		709 16
3324	Providence Press Co., printing,		82 89
3325	J. W. & J. J. Newman, labor, &c.,		6,717 01
3326	Dexter Gorton & Co., carpenters' work, lumber, &c.,		457 51
3327	William H. Miller & Co., repairing tools, &c.,		71 77
3328	Charles H. Pierce, salary as assistant engineer,		250 00
3329	Otis F. Clapp, " " " "		208 33
3330	Howard A. Carson, " " " "		250 00
3331	Charles H. Swan, " " " "		208 33
3332	William T. Schneider, " " " "		100 00
3333	John E. Bowen, " " " "		100 00
3334	Lepriete Sweet, 2d, " " " "		83 33
3335	Edmund B. Weston, " " " "		83 33
3336	William M. Brown, Jr., " " " "		83 33
3337	Daniel C. Stone, " " " "		37 63
3338	Edwin P. Dawley, " " " "		83 33
3339	Frank B. Ferris, " " " "		66 67
3340	Thomas L. Botts, " " " "		66 67
3341	William H. Olmstead, " " " "		66 67
3342	Albert L. Bodwell, " " " "		66 67
3343	William F. Janes, " " service pipe engineer,		83 33
3344	Augustus F. Nagle, " " mechanical " "		84 00
3345	George B. Francis, " " student, engineering department,		41 67
3346	Charles A. Harper, " " " " "		41 67
3347	Alfred E. Martin, " " " " "		41 67
3348	Walter F. Slade, " " service pipe clerk, engineering department,		83 33
3349	William Aplin, " " clerk, engineering department,		83 33
3350	William H. Turner, " " " " "		100 00
3351	Irvin H. Potter, " " " " "		56 25
3352	Andrew B. Purdy, " " superintendent of pipe work,		166 67
3353	William H. Patterson, " " inspector on pipe line,		104 00
3354	S. Horace Wheeler, " " " of service pipes,		125 00
3355	Henry M. Wilcox, " " assistant inspector of service pipes,		100 00
3356	Frederic A. Arnold, " " inspector of water fixtures,		100 00
3357	Albert C. Winsor, " " assistant inspector of water fix- tures,		78 00
3358	Edward A. Moran, " " inspector of water meters,		100 00
3359	William Clancey, " " plumber, meter department,		61 25
	Amount carried forward,		\$83,837 30

REPORT OF THE WATER COMMISSIONERS. 19

	Amount brought forward,	\$88,837 80
3360	James H. Higgins, salary as plumber, meter department,	62 50
3361	Alexis C. Miller, " " keeper of Hope reservoir,	75 00
3362	Jeptha Baker, " " " " Sockanosset reservoir,	75 00
3363	Albert E. Angell, salary as temporary assistant, engineering department,	45 50
3364	George H. Slade, salary as temporary assistant, engineering department,	56 80
3365	Edward C. Reynolds, salary as temporary assistant, engineering department,	37 50
3366	George W. Winsor, Jr., salary as temporary assistant, engineering department,	28 50
3367	Charles H. Wheeler, salary as temporary assistant, engineering department,	9 00
3368	Henry G. Dennis, salary as superintendent of pipe yard, &c.,	125 00
3369	Richard M. Wood, salary as clerk at pipe yard,	83 33
3370	John Cuthbert, salary as pumping engineer, Pettaconset station,	104 17
3371	John Hamilton, " " " " " "	85 00
3372	George F. Barney, salary as fireman, Pettaconset station,	60 00
3373	John Tallent, " " " " " "	62 00
3374	John Quinn, " " pumping engineer, Hope station,	125 00
3375	Marcus E. Sherman, " " " " " "	100 00
3376	Michael Hamill, " " fireman, Hope station,	65 00
3377	Judson Davis, " " " " " "	65 00
3378	William F. Tanner, " " axeman,	50 00
3379	Burrows Chace, " " mason and inspector at Hope reservoir,	82 00
3380	James Dalgleish, " " mason at Hope reservoir,	73 50
3381	Michael Hunt, " " " " " "	61 25
3382	Willis G. Clarke, " " laborer at Hope reservoir,	44 80
3383	John F. Parks, " " mason at Hope reservoir,	20 63
3384	John Boyle, " " " " " "	17 50
3385	William H. Kelly, testing cement,	50 69
3386	Jesse W. Coleman, salary as commissioners' clerk,	50 00
3387	Leonard N. Austin, Jr., " " " " " "	75 00
3388	Thomas C. Gushee, " " " " " "	100 00
3389	Phillip B. Chase, " " " " " "	150 00
3390	Clinton D. Sellew, " " secretary of water commissioners,	200 00
3391	John Funnell, " " janitor, &c.,	57 10
3392	John West, on account for superintending the running of the Cornish engine,	500 00
3393	Samuel M. Gray, engineering services, self and assistants,	157 88
3394	Samuel M. Gray, on account for paying laborers,	200 00
3395	Samuel M. Gray, horse hire, &c.,	71 37
3396	Abbott Lawrence, expressage on meters,	26 30
3397	Rhode Island Concrete Co., on account for concreting around service stops,	250 00
3398	W. J. Glover & Co., covering steam pipes, boilers, &c., Worthington engine,	24 22
3399	Leonard & Ellis, oil,	63 07
3400	George L. Claffin & Co., oil, &c.,	16 41
3401	John Callahan, sharpening tools,	27 50
3402	Bugbee & Hall, stationery,	18 05
3403	Union Water Meter Co., water meters and repairing,	599 40
3404	J. Putney, thermometers,	5 00
3405	H. W. Clapp, drop base sewer caps,	14 00

Amount carried forward, . . . \$88,106 70

	Amount brought forward,		\$88,105 70
3406	Franklin Olds, sealing and adjusting scales,		8 75
3407	Clinton D. Sellaw, paid by him for sundries,		27 12
3408	Charles H. Pierce, paid by him for sundries,		49 63
3409	Charles H. Pierce, paid by him for labor,		1,379 91
3410	Cleveland Brothers, office furniture, repairing, &c.,		29 10
3411	Joshua B. Chapin, services in examination of Pawtuxet river and its tributaries,		141 03
3412	Robert Morrow, horse hire by engineers,		30 00
3413	Thomas J. Hill, rent of wharf and pipe yard,		875 00
3414	P. J. Kilkenny, stucco work and mouldings on engine house at Pettaconset,		898 60
3415	James Keeley, carpenters' work, meter department,		6 00
3416	Fales, Jenks & Sons, water meters,		453 90
3417	Thomas Phillips & Co., sheet lead, &c.,		13 56
3418	A. C. Eddy & Studdleys, rubber packing, &c.,		13 31
3419	Mason, Chapin & Co., sundries,		16 63
3420	Charles P. Chapman, on account for curbing, steps, buttresses, &c., at Hope station,		1,300 00
3421	Chadwick & Higson, oil, meal, &c.,		6 50
3422	B. F. Almy, cop waste,		18 00
3423	Michael Kehoe, services as mason at Hope reservoir,		17 50
3424	Barker, Whitaker & Co., flax packing, oil tanks, tools, &c.,		115 87
3425	Fuller Iron Works, valve boxes, special castings, &c.,		288 03
3426	Newport & Providence Lead Works, lead pipe and pig lead,		3,773 92
3427	Joshua B. Chapin, services and expenses in examination of Pawtuxet river and its tributaries,		90 23
3428	Charles H. Pierce, on account for paying laborers,		400 00
3429	I. B. Mason, lard,		7 70
3430	Wood & Winsor, labor, pipe and fittings, &c.,		137 94
3431	Hopkins & Pourroy, cement, carting pipes, teaming, &c.,		399 69
3432	James Glass, slating roof of engine house porch at Pettaconset,		110 38
3433	Samuel L. Watson, use of teams at Pettaconset,		150 25
3434	Tingley Marble Co., on account for furnishing and erecting marble tile floor at Hope engine house,		1,600 00
3435	T. & W. Breeck, rent of offices, &c.,		877 50
3436	James H. Tower, on account for furnishing and erecting iron fence, at Hope reservoir,		1,300 00
3437	Architectural Iron Works, iron roof for engine house at Pettaconset, &c.,		743 06
3438	Dexter Gorton & Co., carpenter's work, lumber, &c.,		834 01
3439	Newport & Providence Lead Works, lead,		1,617 50
3440	Providence Gas Co., coke,		15 00
3441	Samuel M. Gray, on account for paying laborers,		400 00
3442	Samuel M. Gray, for paying laborers, &c.,		1,301 04
3443	James Glass, slating roof of engine house at Pettaconset,		173 84
3444	Samuel M. Gray, paid by him on account of accident to Simeon Noel, (one-half charged to Paulding, Kemble & Co.,)		79 10
3445	Jarius Putney, thermometers,		12 50
3446	J. Herbert Shedd, salary as chief engineer,		2,000 00
3447	Charles H. Pierce, " " assistant engineer,		250 00
3448	Otis F. Clapp, " " " "		306 33
3449	Howard A. Carson, " " " "		250 00
3450	Charles H. Swan, " " " "		306 33
3451	William T. Schneider, salary as assistant engineer,		100 00
3452	John E. Bowen, " " " "		100 00
	Amount carried forward,		\$111,386 48

REPORT OF THE WATER COMMISSIONERS. 21

Amount brought forward,		\$111,336 48
3453	Leprillete Sweet, 2d, salary as assistant engineer,	83 33
3454	Edmund B. Weston, " " " "	83 33
3455	William M. Brown, Jr., " " " "	83 33
3456	Edwin P. Dawley, " " " "	83 33
3457	Frank B. Ferris, " " " "	66 67
3458	Thomas L. Boits, " " " "	66 67
3459	William H. Olmstead, " " " "	66 67
3460	Albert L. Bodwell, " " " "	66 67
3461	William F. Jones, " " service pipe engineer,	83 33
3462	Augustus F. Nagle, " " mechanical engineer,	30 00
3463	George B. Francis, " " student, engineering department,	41 67
3464	Charles A. Harper, " " " "	41 67
3465	Alfred E. Martin, " " " "	41 67
3466	Walter F. Slade, " " service pipe clerk, engineering department,	83 33
3467	William Aplin, " " clerk, engineering department,	83 33
3468	William H. Turner, " " " "	100 00
3469	Irvin H. Potter, " " " "	58 50
3470	Andrew B. Purdy, " " superintendent of pipe work,	166 67
3471	William H. Patterson, " " inspector on pipe line,	108 00
3472	S. Horace Wheeler, " " " of service pipes,	125 00
3473	Henry M. Wilcox, " " assistant inspector of service pipes,	100 00
3474	Frederic A. Arnold, " " inspector of water fixtures,	100 00
3475	Albert C. Winsor, " " assistant inspector of water fixtures,	81 00
3476	Edward A. Moran, " " inspector of water meters,	100 00
3477	William Clancey, " " plumber, meter department,	62 50
3478	James H. Higgins, " " " "	65 00
3479	Alexis C. Miller, " " keeper of Hope reservoir,	77 50
3480	Jeptha Baker, " " Sockanosset reservoir,	77 50
3481	Willis G. Clark, " " laborer at Hope reservoir,	42 40
3482	Albert E. Angell, salary as temporary assistant, engineering department,	45 50
3483	George H. Slade, salary as temporary assistant, engineering department,	84 40
3484	Edward C. Reynolds, salary as temporary assistant, engineering department,	39 00
3485	George W. Winsor, Jr., salary as temporary assistant, engineering department,	37 50
3486	Charles H. Wheeler, salary as temporary assistant, engineering department,	25 00
3487	Charles E. Shedd, salary as temporary assistant, engineering department,	21 12
3488	Henry G. Dennis, salary as inspector of pipes,	125 00
3489	Richard M. Wood, " " clerk at pipe yard,	83 33
3490	John Cuthbert, salary as pumping engineer, Pettaconset station,	104 17
3491	John Hamilton, salary as fireman, Pettaconset station,	85 00
3492	George F. Barney, " " " "	60 00
3493	John Tallent, " " " "	62 00
3494	John Quinn, " " pumping engineer, Hope station,	125 00
3495	Marcus E. Sherman, " " " "	100 00
3496	Michael Hamill, " " fireman, Hope station,	65 00
3497	Judson Davis, " " " "	65 00
3498	William F. Tanner, " " axeman,	52 00
3499	Barrows Chace, salary as mason and inspector at Hope reservoir,	96 00
Amount carried forward,		\$114,380 57

	Amount brought forward,	\$114,980 57
3500	James Dalgleish, salary as mason at Hope reservoir,	77 40
3501	Michael Hunt, " " " " " "	64 50
3502	Daniel Shields, " " " " " "	64 50
3503	John Boyle, " " " " " "	64 50
3504	John F. Parks, " " " " " "	14 00
3505	James Tack, " " " " " "	5 00
3506	Jesse W. Coleman, " " commissioners' clerk,	50 00
3507	Leonard N. Austin, Jr., salary as commissioners' clerk,	75 00
3508	Thomas C. Gushée, " " " " "	100 00
3509	Philip S. Chase, " " " " "	150 00
3510	Clinton D. Sellev, salary as secretary of water commissioners,	200 00
3511	John Purnell, " " janitor, &c.,	58 86
3512	Samuel M. Gray, engineering services self and assistants,	187 73
3513	Samuel M. Gray, horse hire, &c.,	86 75
3514	Charles H. Pierce, paid by him for labor,	1,431 07
3515	Hugh Mack, labor at Hope engine house,	13 50
3516	Abbott Lawrence, expressage on meters,	19 25
3517	City of Providence, Highway Department, paving stones,	6 33
3518	James Sellers, use of derrick,	5 00
3519	Robert Morrow, horse hire by engineers,	21 00
3520	John L. Arnold, labor, &c., at Hope engine house,	16 48
3521	Tingley Marble Co., marble tile floor at Hope engine house, &c.,	213 50
3522	Olney Brothers, oil,	19 50
3523	Union Water Meter Co., water meters and repairing,	436 51
3524	Charles H. Pierce, paid by him for sundries,	105 68
3525	Joseph J. Cooke, salary as water commissioner,	500 00
3526	Charles E. Carpenter, " " " " "	500 00
3527	William Corliss, " " " " "	500 00
3528	Harrison Hallett, painting iron work of engine house at Petta-	
	conset,	670 00
3529	Dexter Gorton & Co., carpenters' work, lumber, &c.,	195 00
3530	Tucker, Swan & Co., coal,	1,875 00
3531	John West, on account for superintending the running of the	
	Cornish engine,	500 00
		<hr/>
		\$123,135 59

REPORT OF THE WATER COMMISSIONERS. 23

RECEIVED FROM JUNE 1, 1876, TO AUGUST 31, 1876, INCLUSIVE, AND PAID
TO THE CITY TREASURER.

1876.		
June	19. Of Fuller Iron Works, for scrap iron, . . .	\$56 63
	Of George Manuel, for pasturage of a part of the "Gardiner" farm, . . .	9 00
	Of Thomas Phillips & Co., for cups for drinking fountains, . . .	5 00
	Of Henry G. Dennis, for old rope, . . .	6 50
	20. Of Lewis Dexter, for cast iron water pipes, . . .	139 99
	23. Of Fletcher Manufacturing Co., for labor and materials, . . .	117 67
	Of Samuel M. Gray, for old lumber and mortar, . . .	4 50
	24. Of City of Providence, for sewer expenses, . . .	654 03
	29. Of James McNally and Joseph W. Padelford, for laying water pipes in Teft street, . . .	60 00
July	1. Of Henry L. Johnson, for three months' rent of land in Pawtuxet, to July 1, 1876, . . .	21 75
	13. Of Warren R. Perce, for extra labor laying water pipes in Francis street, . . .	26 50
	Of Yetter & Wack, for screw for street sprinkler, . . .	2 50
	22. Of Harlon A. Page, for extra labor laying water pipes in Oliver street, Johnston, . . .	64 46
Aug.	1. Of Peleg P. Cranston, for three months' rent of "Randall estate," so called, to July 1, 1876, . . .	50 00
	12. Of John Smurthest, for three months' rent of farm in Warwick, purchased of Richard U. Rhodes and wife, to September 1, 1876, . . .	56 25
	Of John Smurthest, for three months' rent of farm in Warwick, purchased of Miss Patience W. Chace, to September 30, 1876, . . .	43 75
	25. Of Samuel M. Gray, for error in time of mason for June, 1876, . . .	1 25
	Of Union Railroad Co., for six months' rent of land in Pawtuxet, to August 23, 1876, . . .	12 50
	26. Of City of Providence, for sewer expenses, . . .	4,002 36
	28. Of Otis Phillips, for laying water pipes in Bowen street, Johnston, . . .	30 00
	31. Of Swan Point Cemetery, for labor and materials, . . .	26 46
	Of R. S. Burrough & Co., for empty oil barrel, . . .	40
	For setting and repairing meters during the present quarter, . . .	664 78
	For laying service pipes during the present quarter, . . .	799 83
	For penalties during the present quarter, . . .	36 00
	For water meters, during the present quarter, . . .	3,163 30
	For water during the present quarter, . . .	22,867 39
		<u>\$32,946 29</u>

TRIAL BALANCE OF LEDGER, AUGUST 31, 1878.

	DR.	
Hope reservoir, for land,		\$117,822 13
" " " construction,		290,863 83
" " " gate houses,		4,207 39
" " " iron railing,		2,344 52
" " " fence,		2,382 15
" " " improvement of grounds,		9,094 89
Hope engine house,		107,894 63
Sockanosset reservoir, for land,		14,129 38
" " " construction,		211,233 93
" " " gate houses,		18,698 19
" " " improvement of grounds,		14,850 88
Lincoln reservoir, for land,		2,954 54
Line of leading mains, for land and damages,		1,665 00
" " " " labor and materials,		20,422 75
Force main line, for land and damages,		3,006 35
" " " labor and materials,		6,875 30
Office furniture, stoves, gas fixtures, etc.,		1,316 91
Rent of offices,		8,069 44
Books, stationery, etc.,		608 02
Fuel and lights,		233 32
Horse hire by commissioners,		19 00
Traveling expenses of commissioners,		161 92
Janitor of rooms,		522 78
Commissioners' salaries,		23,042 20
Secretary's salary,		3,255 48
Clerks' salaries,		4,436 53
Sundries,		522 71
Printing,		2,413 76
Advertising,		1,946 88
Fences,		2,075 38
Rent of wharves and pipe yards,		8,094 38
Stop valves,		76,485 18
Linking curved pipes,		232 75
Store house and work shop,		1,309 64
Tools,		12,812 97
Labor on pipes,		16,444 55
Cast iron water pipes,		1,332,517 91
Special castings,		105,441 15
Lumber,		1,576 30
Fire hydrants,		113,040 46
Sockanosset hill cross road,		3,855 38
Telegraph lines,		2,642 80
Dwelling houses at Pettaconset,		10,109 23
Culverts and bridge on line of force mains,		6,775 33
Culverts at Pettaconset,		3,557 92
Real estate in Warwick,		11,172 28
Water privileges, mill and other real estate in Pawtuxet,		45,401 65
Pettaconset pumping station, for land,		25,902 41
" " " improvement of grounds,		3,688 38
Amount carried forward		\$2,653,369 84

REPORT OF THE WATER COMMISSIONERS. 25

Amount brought forward,	\$2,653,369 84
Pochasset bridge,	5,539 85
Wharf salaries,	12,092 99
Temporary engine house at Pettaconset,	9,906 18
Roads, slopes, etc., at Pettaconset.	12,055 30
Engine house at Pettaconset.	373,276 69
Natural filter basin,	41,518 85
Removing loam,	482 95
Iron screw piles,	3,766 46
Hydrant bolts,	2,006 04
Pipe bolts,*	1,933 70
Photographs,	328 25
Hydrant heads,	8,352 51
Taps and stops,	20,541 21
Valve covers,	9,634 95
Service pipe,	57,409 59
Hydrant boxes,	31,541 67
Setting fire hydrants.	11,124 35
Check valves,	3,712 48
Valve boxes,	35,602 02
Air cocks, boxes, covers and setting,	519 52
Setting blow-offs,	331 49
A. & W. Sprague Manufacturing Co.,	2,500 00
Samuel M. Gray,	400 00
Paulding, Kemble & Co.,	121,147 40
Sewer department, salaries and office expenses,	711 27
Rhode Island Concrete Co.,	250 00
Builders' Iron Foundry,	2,027 54
R. O. Peck,	147 00
John West,	1,000 00
James H. Tower,	1,300 00
Providence Steam Engine Co.,	52,098 10
Rhode Island Locomotive Works,	30,198 21
Charles P. Chapman,	1,830 20
French, MacKenzie & Co.,	3,150 00
City of Providence, Sewer Department,	70 88
City Treasurer,	298,508 21
City Treasurer, for water payments,	591,021 54
Testing pipe iron,	443 50
Iron drain pipes and gate.	224 21
Carting pipes,	41,062 07
Counsel fees,	5,500 00
Inspection of pipes,	10,498 68
Testing bolts and composition castings,	84 25
Laying water pipes,	416,783 77
Laying service pipes,	33,961 18
Laying suction pipes, etc.,	85 00
Drainage pump and engine,	5,164 84
Hydrants for street sprinklers,	2,651 65
Inspection of pipe laying,	36,800 65
Temporary boarding house at Pettaconset,	1,434 34
Public drinking fountains and troughs,	3,980 57
Warwick test pits,	1,313 40
Engine house at Pettaconset, for drain,	2,132 37
Water meters set, belonging to the city,	2,138 72

Amount carried forward, \$4,966,175 41

Amount brought forward,	\$4,968,175 41
Worthington pumping engine,	35,546 55
Hope pumping engine,	63,139 92
Hope pumping engine, No. 2,	35 37
Cornish pumping engine,	17,116 23
Keeper's house at Sockanosset reservoir,	7,088 84
Pipe in river embankment at Pettaconset,	4,067 83
Inspection of engine work,	5,687 08
Alterations at Hope pumping station for second engine,	784 59
Testing second engine at Hope station,	7,058 39
Drain tiles,	269 09
Bollers for Cornish engine,	13,347 04
Stand pipe at Pettaconset,	1,873 16
Bridge at Pettaconset,	341 85
	<hr/> 5,122,431 83

ENGINEERING DEPARTMENT:—

For instruments,	3,501 93
Tools,	744 94
Furniture, stoves, gas fixtures, etc.,	2,985 30
Draughting,	3,523 52
Labor,	10,695 88
Horse and wagon account,	2,384 05
Horse keeping, shoeing, etc.,	3,341 70
Horse hire,	6,105 65
Rent of offices,	7,470 77
Fuel and lights,	794 31
Janitor of rooms,	1,385 30
Experimental filter,	91 08
Books, stationery, etc.,	3,761 83
Sundries,	3,964 62
Test wells,	1,579 40
Consultations,	337 08
Office building at Pettaconset,	567 60
“ “ “ Sockanosset reservoir,	568 22
Stakes and strips,	1,322 79
Printing,	684 78
Maps,	179 17
Service pipe experiments,	296 04
Temporary assistance,	12,261 50
Salaries,	114,824 87
	<hr/> \$184,307 33

MAINTENANCE.—

Hope pumping station, for coal and wood,	10,362 30
“ “ “ “ engineers,	5,883 36
“ “ “ “ firemen,	3,436 81
“ “ “ “ lights,	2,352 97
“ “ “ “ sundries,	1,333 59
“ “ “ “ night and Sunday watch,	41 23
“ “ “ “ labor on fuel,	8 06
Pettaconset pumping station, for coal and wood,	35,928 82
“ “ “ “ engineers,	8,422 31
“ “ “ “ firemen,	7,897 00
“ “ “ “ labor on fuel,	4,252 77

Amounts carried forward, \$79,859 22 \$5,306,739 16

REPORT OF THE WATER COMMISSIONERS. 27

Amounts brought forward,	\$79,859 22	\$5,306,739 16
Pettaconset pumping station, for sundries,	7,067 98	
" " " " night and Sunday watch,	3,244 53	
Sockanosset reservoir, for watch,	4,244 25	
" " " sundries,	10,383 37	
Ascertaining and removing nuisances on Pawtuxet river,	717 45	
Worthington pumping engine,	8,323 87	
Hope pumping engine,	398 25	
Hope pumping engine, No. 2,	13 78	
Miller boilers at Pettaconset,	142 36	
Change of grades,	3,456 15	
Inspection of water fixtures,	6,827 96	
Repairs on pipe line,	11,391 85	
Meter testing room,	270 01	
Setting, inspection and repair of meters,	1,160 16	
Commissioners' salaries,	9,333 41	
Secretary's salary,	8,255 64	
Clerks' salaries,	7,896 69	
Rent of offices,	1,806 92	
Fuel and lights,	71 93	
Janitor of rooms,	319 82	
Books, stationery, etc.,	763 56	
Printing,	826 40	
Advertising,	91 52	
Sundries,	620 20	
Counsel fees,	1,000 00	
Hope reservoir, for watch,	1,050 00	
" " " sundries,	595 06	
Thawing pipes, gates, etc.,	1,364 83	
Supplying water takers, by reason of frost,	1,280 38	
Engineering department, for rent of offices,	3,319 84	
" " " fuel and lights,	161 66	
" " " janitor of rooms,	650 99	
" " " books, stationery, etc.,	296 64	
" " " printing,	235 93	
" " " salaries,	19,758 54	
" " " sundries,	44 30	
		\$190,854 14

\$5,497,598 30

CR.

Boston hydrants,	29 07	
Water meters,	1,437 33	
Penalties,	552 00	
Water,	591,021 54	
Approved bills,	4,904,553 37	
		\$5,497,598 30

SCHEDULE OF RECEIPTS FOR WATER, BY MONTHS, FROM
COMMENCEMENT TO AUGUST 31, 1876, INCLUSIVE.

MONTHS.	1872.	1873.	1874.	1875.	1876.
January.....		\$40,699 09	\$69,358 70	\$92,102 10	\$106,847 71
February.....	\$796 06	4,814 80	3,678 96	4,674 19	2,989 71
March.....	6,671 82	6,669 73	9,321 19	4,777 42	6,777 69
April.....	1,668 59	2,810 07	4,986 98	10,063 32	13,384 67
May.....	2,063 41	1,766 28	2,338 59	2,574 92	2,598 71
June.....	8,634 89	8,228 92	2,583 35	8,140 99	6,508 71
July.....	3,488 27	6,214 24	13,756 51	9,035 23	14,053 98
August.....	1,818 14	1,441 09	1,963 87	4,001 66	2,324 76
September.....	4,933 44	7,550 64	5,541 84	5,393 34	.....
October.....	5,079 08	8,745 53	9,097 95	12,578 46	.....
November.....	477 04	872 83	1,511 03	1,391 59	.....
December.....	5,872 77	8,072 87	8,076 42	9,481 49	.....
	\$41,003 51	\$97,386 09	\$132,052 39	\$165,144 71	\$155,434 86

1877.]

CITY DOCUMENT.

No. 8.

152 REPORT

OF THE BOARD OF

WATER COMMISSIONERS

OF THE

CITY OF PROVIDENCE,

MARCH 5, 1877.



PROVIDENCE :

ANGELL, BURLINGAME & CO., PRINTERS TO THE CITY.
1877.



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REPORT

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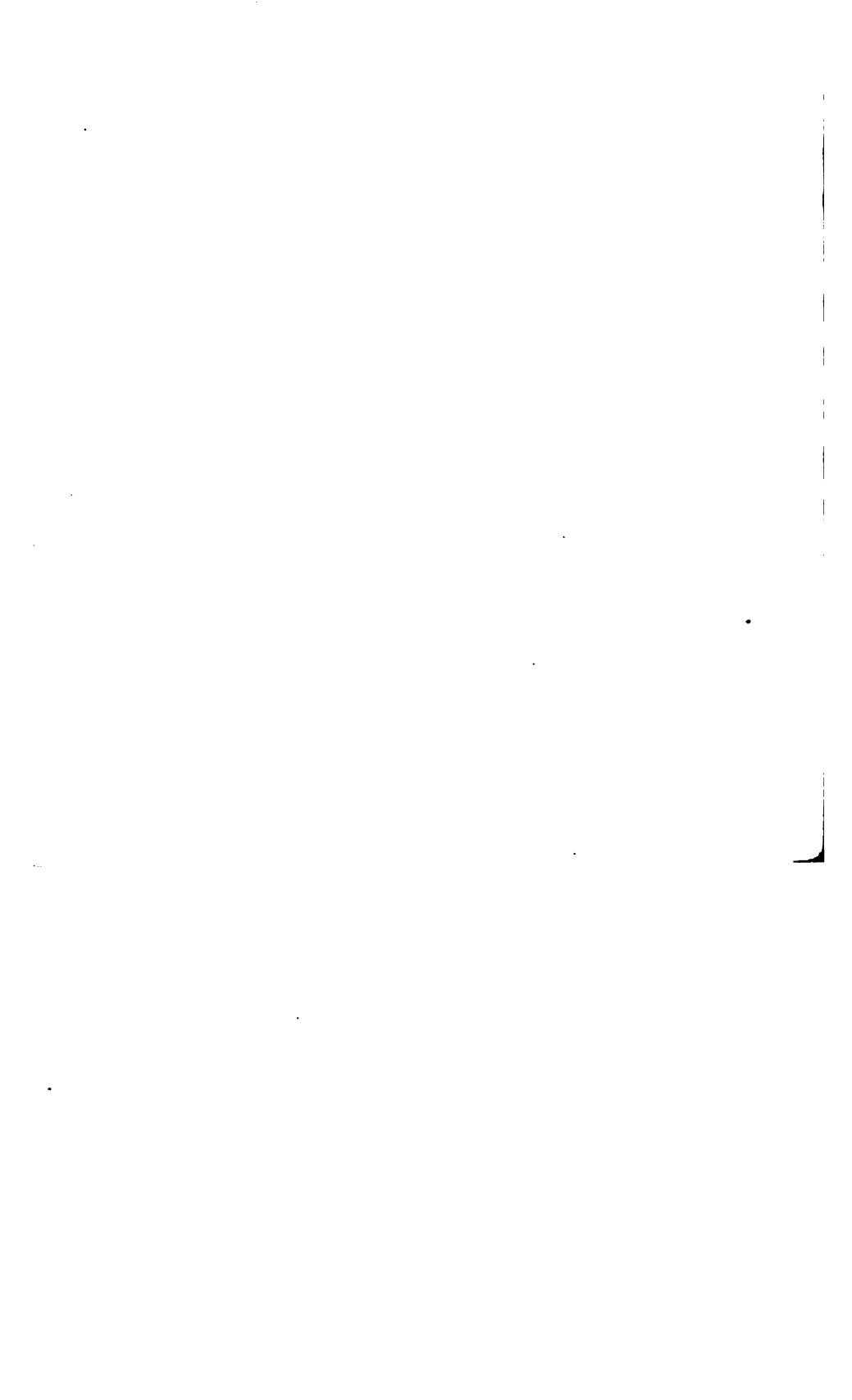
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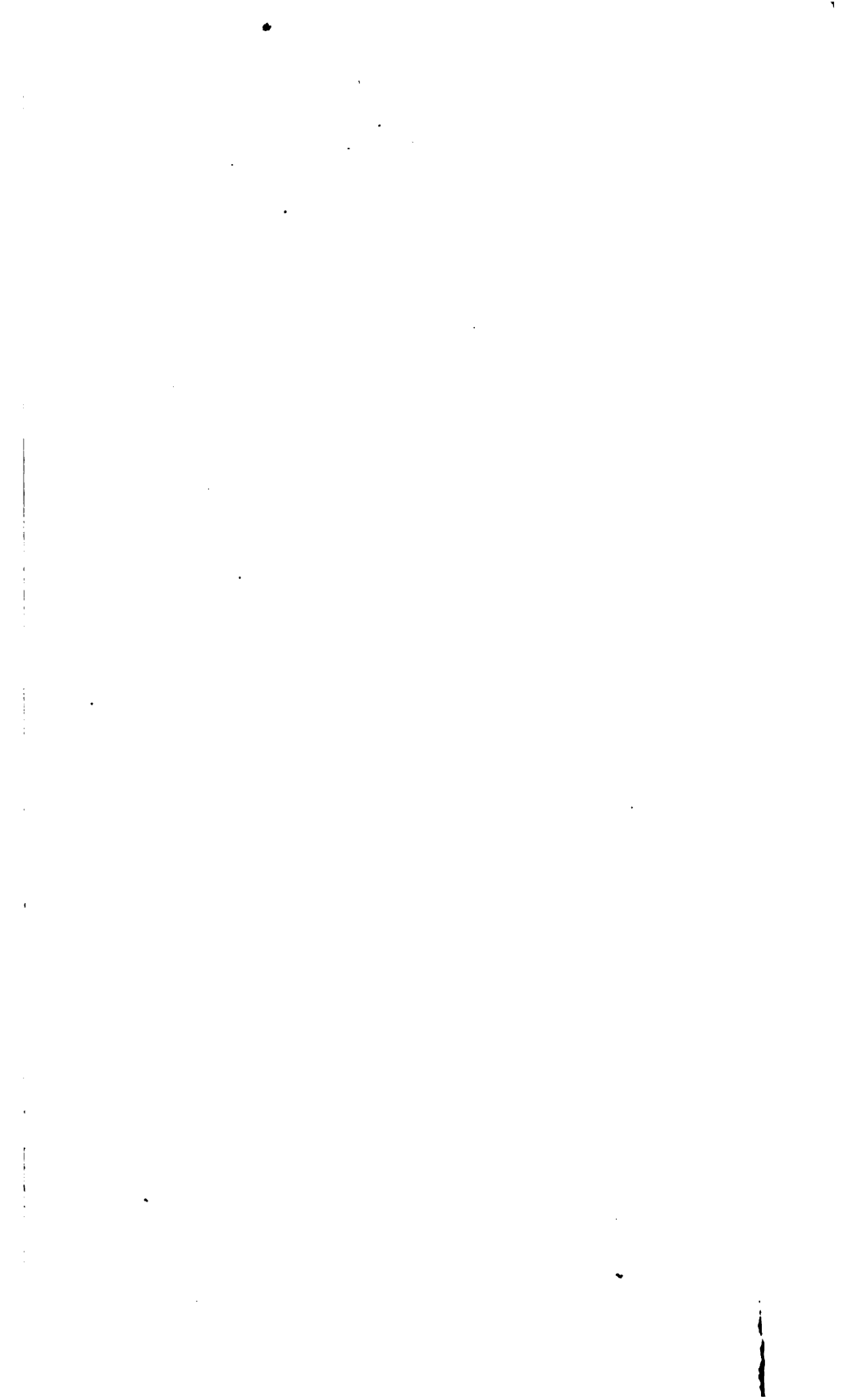


ORGANIZATION
OF THE
PROVIDENCE WATER WORKS.

BOARD OF WATER COMMISSIONERS.

Office No. 35 North Main street.

LODOWICK BRAYTON, PRESIDENT,
HENRY L. PARSONS,
NATHANIEL F. POTTER.



REPORT.

OFFICE OF THE BOARD OF WATER COMMISSIONERS, }
Providence, R. I., March 5th, 1877. }

TO THE HONORABLE THE CITY COUNCIL :—

The Board of Water Commissioners, elected under an ordinance of the City Council, passed October 19th, 1876, respectfully present their first report :—

On the first day of November, 1876, two of the commissioners were engaged by His Honor the Mayor, the third, Mr. Amos D. Lockwood, having declined to accept the position, and on the second day of the same month, received from their predecessors all records, books, papers, plats and other property in their possession belonging to the city.

The vacancy in the board having been filled by the election, by your honorable body, of Mr. Henry L. Parsons, January 18th, he was on the twentieth day of January, 1877, engaged by the Mayor, and immediately entered upon the duties of his office.

Mr. Brayton was unanimously elected President of the Commission.

The lease of the southerly portion of Hill's wharf, on the west side of the river, occupied by the Water Commissioners for the last six years, expired on the first ultimo. An offer of Mr. Hill to rent the wharf and lot for six months from Feb-

ruary 1, 1877, at the same rent as last paid, (thirty-five hundred dollars per annum,) has been accepted.

The southerly portion of the Point Street Iron Works' wharf has been leased for the term of three years, from May 1, 1877, at an annual rent of twenty-five hundred dollars, payable quarterly, with the right to occupy any portion of the same that may be necessary before that time, without charge for such occupancy. The property leased has a frontage of two hundred feet on the harbor line and contains about 81,500 square feet. On the lot is a building, 90.3 feet by 147.2 feet, which with some slight repairs may be made suitable for the storage of such materials as may need to be protected from the weather. The commissioners believe this will be found to be a very desirable change, beside the fact of an annual saving to the city, in rent, of \$1,000 per year. The wharf is situated on the west side of the river, adjacent to Point Street bridge, which will afford convenient communication to the east side.

Realizing the fact that the city is at considerable expense for wharfage for other departments than Water Works and Sewers, it will be the aim of the commissioners, so far as they can, to afford facilities for wharfage to them.

The commissioners have received from the Boston Machine Company "a release from all claims for damages for an alleged infringement of the Lowry Fire Hydrant Patent, and a license for the future use of all hydrants used in connection with the Providence Water Works, whether within or without the city limits," and have paid seven thousand dollars therefor, in accordance with an agreement of the former board. The papers have been approved by the City Solicitor.

On the 31st day of December, 1876, there were in force sixty plumbers' licenses.

The average daily consumption of water, including waste

and leakage, during November and December, 1876, was about 2,650,000 gallons.

WATER PIPES.

The following statement shows the length of pipes laid during the last two months of 1876 ; the sizes of the pipes ; and where laid :

12 INCH.

In Fenner avenue,	-	-	-	83 feet.
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8 INCH.

In Smithfield avenue,	-	-	-	3,922 feet.
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6 INCH.

In Hidden, Linton and Thayer streets ; in streets to slaughter houses, Pawtucket ; in New Fenner avenue, Cranston, and for Samuel A. Irons, Olneyville,	-	-	-	2,667 feet.
--	---	---	---	-------------

Total,	-	-	-	-	6,672 feet.
--------	---	---	---	---	-------------

or $1 \frac{268}{1000}$ miles.

Statement of sizes and lengths of pipes laid since the commencement of the work :

36 inch,	-	-	-	10,084 feet.
30 inch,	-	-	-	59,076 feet.
24 inch,	-	-	-	23,942 feet.
20 inch,	-	-	-	6,604 feet.
16 inch,	-	-	-	26,012 feet.
12 inch,	-	-	-	39,001 feet.
10 inch,	-	-	-	10,507 feet.
8 inch,	-	-	-	96,256 feet.
6 inch,	-	-	-	436,666 feet.
Total,	-	-	-	708,148 feet.

or $134 \frac{118}{1000}$ miles.

The pipes ordered by the City Council to be laid in Manning street, from Governor street to Ives street, and in Keene street, from the present termination near Brown street to a point four hundred feet easterly, have not been laid, on account of the cold weather.

FIRE HYDRANTS.

Twelve fire hydrants were set during the last two months of 1876, one in each of the following locations :

Burnside street, south-east corner of Colfax street.

“ “ east side, 178 feet north of Gallup street.

“ “ north-east corner of Sayles street.

Congdon street, west side, opposite south side of Hidden street.

Oxford street, north-east corner of Burnside street.

Potter's avenue, south-east corner of Burnside street.

“ “ south side, 179 feet east of Ocean street.

Smithfield avenue, east side, 435 feet north of Branch avenue.

“ “ “ “ 925 “ “ “ “

“ “ “ “ opp. north line of Nellie street.

“ “ north-east corner of North Grove street.

“ “ east side, 375 feet north of Railroad bridge.

The hydrants set in Burnside and Oxford streets and in Potter's avenue, were ordered by the City Council, on pipes laid by the former board ; the remainder were set on lines of pipes laid by the present board, by order of the City Council or under agreements made by the former board with persons to be supplied. The total number of fire hydrants is now one thousand and four.

WATER METERS.

Forty-seven Ball & Fitts' water meters, made by the Union Water Meter Company, and seven water meters made by Fales, Jenks & Sons, were put in at the expense of water takers during the last two months of 1876. Seventeen five-eighths inch water meters, made by Fales, Jenks & Sons, have

been substituted for three-quarter inch meters of the same make, and one one-inch meter, made by Fales, Jenks & Sons, has been replaced by a three-quarter inch meter of the same make.

On the 31st day of December last there were twenty-seven hundred and seventy-four water meters in use, viz :

KIND.	SIZES.							TOTALS.
	$\frac{3}{4}$ inch.	$\frac{1}{2}$ inch.	1 inch.	$1\frac{1}{4}$ inch.	2 inch.	3 inch.	4 inch.	
Ball & Fitts.....	1,594	280	96	47	10	1	1	2,029
Worthington.....	167	.....	.....	.....	.....	.....	1	168
Fales, Jenks & Sons,	191	347	24	4	11	.....	.....	577
	1,952	627	120	51	21	1	2	2,774

APPLICATIONS FOR WATER.

The total number of applications for a supply of water to December 31, 1876, inclusive, was seventy-eight hundred and thirty-nine.

SERVICE STOPS.

The number of service stops opened to December 31, 1876, inclusive, was sixty-nine hundred and twenty-four ; eighty-nine of which were opened in November and December, 1876. The following table exhibits the number of service stops opened, by months, from the commencement to December 31, 1876, inclusive :

MONTHS.	1871	1872	1873	1874	1875	1876
January.....		54	33	21	34	55
February.....		47	18	18	7	25
March.....		38	34	63	7	45
April.....		109	109	108	32	108
May.....		224	206	147	163	168
June.....		329	295	151	172	148
July.....		333	261	127	141	158
August.....		224	209	123	83	94
September.....		184	147	139	101	94
October.....		138	135	160	92	84
November.....		100	104	185	86	54
December.....	56	83	45	122	60	35
	56	1,863	1,596	1,364	977	1,068

During the last two months of 1876, four stops were closed for non-payment of bills, one of which was re opened on payment of bill and a penalty of two dollars. Three stops previously closed for non-payment were re-opened; in two cases the bill and penalty of two dollars each were paid, and the remaining one, for reason of attendant circumstances, was re-opened on payment of bill without penalty. Forty-six stops closed for non-payment remained unopened December 31, 1876. Four stops were permanently closed. At the close of the calendar year 1876 there were in use sixty-six hundred and twenty-six stops.

USES OF WATER.

Water was, on the 31st day of December last, supplied for the following uses:

5 armories; 13 bakeries; 38 banks; 123 bar-rooms; 3 bath-houses; 120 boarding-houses; 1 bonnet bleachery; 10 bottling establishments; 43 building purposes; 2 burying

grounds; 1 burnisher; 2 car-houses; 2 carriage depositories; 3 chasers; 32 churches; 1 city barn; 2 city bridges; 1 city building; 14 city drinking fountains; 32 city drinking troughs; 1,004 city fire hydrants; 15 city fire steamer and hose stations; 11 club rooms; 14 coal yards; 1 college; 1 colored shelter; 1 conservatory of music; 4 convents; 2 court-houses; 1 decorator; 1 Dexter asylum; 2,727 dwellings of one family; 3,032 dwellings of two families; 278 dwellings of three families; 348 dwellings of four families; 42 dwellings of five families; 62 dwellings of six families; 7 dwellings of seven families; 7 dwellings of eight families; 1 dwelling of nine families; 1 dwelling of ten families; 1 dwelling of twelve families: 2 dye houses; 14 elevators; 1 engine turner; 6 engravers; 2 enamel works; 1 express carriage house; 57 fire supplies, private; 63 fountains, private; 2 fountains, public; 1 furrier; 3,538 garden and street hydrants; 4 gas holders; 6 gold and silver refiners; 5 gold and silver platers; 1 grain elevator; 59 green houses; 22 halls; 1 home for aged men; 1 home for aged women; 2 hospitals; 18 hotels; 1 infirmary; 5 laundries; 4 libraries; 1 lithographer; 23 lodging houses; 2 lumber dealers; 1 mason. *Manufacturing establishments.*—3 beer; 2 belt and picker; 3 blank book; 2 bleacheries; 1 bologna sausage; 2 boot and shoe; 2 box; 1 braiding works; 3 brass foundries; 2 breweries; 1 brush; 2 butt; 9 carriage; 2 cement pipe; 1 chain; 1 chemical; 6 cigar; 1 cigar box; 20 cloak and dress; 1 coffin; 7 confectionery; 1 corset; 3 colorers of jewelry; 9 cotton; 2 crocus; 1 cutlery; 3 die sinkers; 2 dye wood; 1 emery wheel; 2 enamellers of jewelry; 1 eyelet; 3 file; 9 furniture; 1 gas; 1 gas burner; 4 gas fixtures; 1 gas stove; 1 geer; 3 hat; 7 harness; 3 ice cream and soda water; 1 iron company; 1 iron fence; 10 iron foundries; 1 Japan switch; 1 jewelers' cards; 98 jewelry; 4 lapidaries; 29 machinists; 1 mowing machine; 1 nail keg; 2 oil; 1 organ; 1 paper box; 1 paper collar; 3 paper cob tube; 1 pattern; 4 patent medicines; 1 pencil case; 4 picture frame; 2 paint works; 2 pump; 2 reed; 1 rubber goods; 1 rubber tubing; 5 sash and blind; 1 saw; 2

screw ; 1 sheet iron ; 1 shell comb ; 2 shirt ; 3 silver ware ; 6 soap ; 1 spiral spring ; 1 starch ; 1 steam boiler ; 2 steam engine ; 1 stencil plate ; 1 stove ; 2 tanners ; 2 thread ; 1 tin-ware ; 4 tool ; 2 top roll ; 7 woolen goods ; 1 yeast. *Markets.*—51 fish ; 125 meat. *Mills.*—2 drug and grain ; 3 flour and grain ; 10 planing. 1 nickel plater ; 1 opera house ; 2 orphan asylums ; 9 organs ; 5 oyster houses ; 681 offices ; 10 photographers ; 10 printing establishments ; 9 plaster and stucco workers ; 17 plumbers ; 10 provision curers and packers ; 6 police stations ; 7 railroads ; 2 reading rooms ; 46 restaurants ; 1 roofer. *Saloons.*—5 billiard ; 3 bowling ; 6 ice cream ; 27 lager beer ; 9 oyster. *Schools.*—1 boarding ; 15 private ; 38 public ; 1 reform. *Shops.*—54 barber ; 11 blacksmith ; 1 carpenter ; 4 cooper ; 2 gunsmith ; 1 junk ; 19 paint ; 14 shoemaker ; 26 tailor ; 5 tinman. *Stables.*—6 hack ; 46 livery ; 349 private ; 5 sale ; 82 work. 13 steamboats ; 13 steamships ; 6 steam and gas pipe fitters. *Stores.*—1 agricultural implements ; 48 apothecary ; 1 auction ; 4 book ; 34 boot and shoe ; 1 bread ; 2 carpet ; 2 carriage trimmings ; 1 chemicals ; 10 cigar ; 26 clothing ; 14 confectionery ; 1 crockery ; 2 drug ; 45 dry goods ; 83 fancy goods ; 13 flour and grain ; 12 fruit ; 12 furniture ; 10 gents' furnishing goods ; 161 grocery, retail ; 14 grocery, wholesale ; 11 hardware ; 2 hide and leather ; 2 hoop skirt ; 12 house furnishing goods ; 4 house paper ; 3 iron and steel ; 15 jewelry ; 14 liquor ; 1 lime and brick ; 2 manufacturers' supplies ; 33 millinery ; 11 newspaper ; 4 oil and paint ; 2 paper and paper stock ; 2 piano forte ; 9 produce, wholesale ; 4 sewing machine ; 4 stationery ; 2 stove ; 6 tea ; 2 trunk ; 1 toy ; 1 umbrella ; 1 wooden ware ; 1 wool ; 3 woolen goods. 1 State prison ; 1 store house ; 6 stone cutters ; 1 theatre ; 4 undertakers ; 1 United States custom house building ; 3 upholsterers ; 2 water boats ; 1 wheelwright ; 1 wood turner ; 7 wood yards ; 31 not classed.

The amount of expenditures during the last
two months of 1876, was—

For construction and extension, (a very large

part of which was for material contracted for
by our predecessors, and is now on hand,) \$51,095 76
Expended as follows, viz.:

Fire hydrants, boxes, covers and bolts, (including \$7,000 paid for license to use hydrants,).....	\$22,784 34
Cast-iron water pipes.....	16,260 52
Stop valves.....	2,213 30
Laying water pipes.....	1,984 94
Rent of wharf and pipe yard.....	875 00
Hope reservoir fence.....	868 61
Service pipe and boxes.....	629 10
Engine house at Pettaconset.....	541 37
Labor on and carting pipes.....	459 20
Special castings.....	405 39
Tools.....	329 39
Rent of offices.....	292 50
Laying service pipes ..	247 08
Commissioners' salaries.....	100 00
Secretary's salary.....	100 00
Public drinking fountains and troughs,	79 21
Clerks' salary	75 00
Hope engine house.....	46 03
Sundries.....	25 11
Engineering department, for salaries,	2,732 18
Engineering department, for sundries,	47 49
	<hr/>
	\$51,095 76

For maintenance, - - - \$7,818 70

Expended as follows, viz.:

Pettaconset station, coal.....	\$766 93
“ “ salaries of	
pumping engineers and firemen....	599 91
Pettaconset station, supplies, (oil, tallow, &c.).....	194 03
Hope station, salaries of pumping engineers and firemen.....	769 88
Hope station, supplies, (oil, tallow, &c.)	104 23
Hope engine house, cleaning.....	16 00
Water meters, and setting and repairing meters.....	1,746 30
	<hr/>
Amount carried forward.....	\$4,197 28

Amount brought forward.....	\$4,197 28
Rent of offices.....	292 50
Commissioners' salaries.. ..	100 00
Secretary's salary.....	100 00
Clerks' salaries.....	375 00
Inspection of water fixtures.....	350 00
Janitors salary, &c.....	111 83
Hope reservoir, keeper's salary and labor.....	202 33
Sockanosset reservoir, keeper's salary,	151 00
Hope engine house, clock.....	130 42
Pipe line.	117 69
Cornish pumping engine.....	59 99
Buildings at Pettaconset.....	11 14
Sundries.....	43 05
Engineering department, for salaries,	1,558 34
Engineering department, for sundries,	18 08
	<hr/>
	\$7,818 70

The amount of expenditures during the last two months of 1876, was	\$58,914 46
The total amount of expenditures, to December 31, 1876, inclusive, was.....	5,052,444 17
The net cost of construction and extension for two months ending December 31, 1876, (including amounts paid on contracts executed by our predecessors,) was.....	49,961 86
The net cost of construction and extension, for the calendar year, was	332,954 98
The net cost of construction and extension to December 31, 1876, inclusive, was.....	4,522,970 65
The net cost of maintenance, for the last two months of 1876, was	5,408 72
The net cost of maintenance, for the calendar year 1876, was.....	53,816 57
The net cost of maintenance, to December 31, 1876, inclusive, was	206,777 93
The total amount of appropriations, to December 31, 1876, inclusive, was—	
For construction and extension, ...	\$5,100,000 00
For maintenance for the year ending September 30, 1877,.....	75,000 00
	<hr/>
	5,175,000 00

The unexpended balances December 31,
1876, were—

For construction and extension,....	61,387 37	
For maintenance,.....	61,168 46	
		122,555 83

The amount received during the last two months
of 1876, all of which was paid to the City
Treasurer, was—

For water supplies,.....	\$6,756 55	
For water meters,.....	1,938 70	
For penalties,.....	6 00	
For sundries,.....	15,746 67	
		\$24,447 92

THE FOLLOWING IS A STATEMENT OF RECEIPTS FOR WATER,
BY MONTHS, FROM COMMENCEMENT TO DECEMBER 31, 1876,
INCLUSIVE.

MONTHS.	1872.	1873.	1874.	1875.	1876.
January.....		\$40,699 09	\$69,356 70	\$92,102 10	\$106,847 71
February.....	\$796 06	4,314 80	3,678 96	4,674 19	2,939 71
March.....	6,671 82	6,669 73	9,221 19	4,777 42	6,777 07
April.....	1,688 59	2,810 07	4,936 98	10,093 32	13,384 63
May.....	2,063 41	1,766 28	2,338 59	2,574 92	2,598 33
June.....	8,634 89	8,228 92	2,583 35	8,140 99	6,506 75
July.....	3,488 27	6,214 24	13,756 51	9,935 23	14,055 90
August.....	1,818 14	1,441 09	1,953 37	4,001 66	2,324 74
September.....	4,933 44	7,550 64	5,541 34	5,393 34	13,053 49
October.....	5,079 08	8 745 53	9,097 95	13,578 46	8,623 85
November.....	477 04	872 83	1,511 03	1,291 59	908 43
December....	5,372 77	8,072 87	8,076 42	9,481 49	5,848 12
	\$41,003 51	\$97,386 09	\$132,052 39	\$165,144 71	\$183,868 73

The total amount received for water to Jan-
uary 1, 1877, was - - - \$619,455 48

The amount of all receipts to January 1, 1877, was 941,054 42

The estimated expenditures for maintenance of the works, for the financial year ending September 30, 1877, as made by the former board, was seventy-five thousand dollars; this amount, it is now believed, will be sufficient.

The commissioners not being aware of what amount of work of construction and extension will be ordered by your honorable body, "including the wants thereof," are unable to present an estimate therefor.

There was on hand on the first day of January, 1877, the following material:

9 36-in. pipes,	8 6-in. eighth turns,
7 30-in. pipes,	3 4-in. eighth turns,
28 24-in. pipes,	4 10-in. sixteenth turns,
12 20-in. pipes,	7 8-in. sixteenth turns,
178 16-in. pipes,	21 6-in. sixteenth turns,
55 12-in. pipes,	17 12-in. bevel hubs,
24 10-in. pipes,	3 10-in. bevel hubs,
395 8-in. pipes,	17 8-in. bevel hubs,
2,271 6-in. pipes,	49 6-in. bevel hubs,
12 30-in. branches, various outlets,	1 36-in. sleeve,
8 24-in. branches, various outlets,	38 30-in. sleeves,
8 20-in. branches, various outlets,	42 24-in. sleeves,
67 16-in. branches, various outlets,	3 20-in. sleeves,
19 12-in. branches, various outlets,	1 16-in. sleeve,
13 10-in. branches, various outlets,	18 12-in. sleeves,
80 8-in. branches, various outlets,	3 10-in. sleeves,
235 6-in. branches, various outlets,	23 8-in. sleeves,
14 4-in. branch,	16 6-in. sleeves,
1 30-in. blow-off,	2 4-in. sleeves,
1 24-in. blow-off,	1 30-in. to 24-in. reducer,
1 36-in. man-hole,	1 24-in. to 12-in. reducer,
1 30-in. man-hole,	1 20 in. to 16 in. reducer,
1 24-in. man-hole,	1 16-in. to 12-in. reducer,
7 30-in. curved pipes,	1 12-in. to 8-in. reducer,
11 24-in. curved pipes,	1 10-in. to 8-in. reducer,
6 20-in. curved pipes,	2 8-in. to 6-in. reducers,
2 16-in. curved pipes,	6 16-in. gates,
10 8-in. quarter turns,	2 12-in. gates,
8 6-in. quarter turns,	1 10-in. gate,
1 4-in. quarter turn,	6 8-in. gates,
3 12-in. eighth turns,	74 6-in. gates,
4 10-in. eighth turns,	29 iron gate boxes,
9 8-in. eighth turns,	5 extra rings,

4 extra covers,	17 16-in. caps,
6 wooden gate boxes,	11 12-in. caps,
108 hydrants,	7 10-in. caps,
88 hydrant boxes,	143 8 in. caps,
3 extra hydrant box covers,	69 6-in. caps,
3 8-in. blow-off bends,	1 4-in. cap,
3 30-in. caps,	4 8-in. pipe collars,
6 2 4-in. caps,	10 6-in. pipe collars,
4 20-in. caps,	10,419 pounds pig lead.

	<i>Taps.</i>	<i>Stops.</i>	<i>Plugs.</i>
$\frac{1}{2}$ -in.	3,256	3,133	13
$\frac{1}{4}$ -in.	378	305	12
$\frac{3}{4}$ in.	49	52	14
$\frac{1}{2}$ in.	60	54	15
1-in.	11	23	14

Tin-lined Lead Pipe.

$\frac{1}{2}$ -in. 623 pounds,	1-in. 120 pounds,
$\frac{1}{4}$ -in. 953 pounds,	$1\frac{1}{4}$ in. 275 pounds,
$\frac{3}{4}$ -in. 1,316 pounds,	$1\frac{1}{2}$ -in. 37 pounds.

Common Lead Pipe.

$\frac{1}{2}$ -in. 2,382 pounds,	1-in. 474 pounds,
$\frac{1}{4}$ in. 2,240 pounds,	$1\frac{1}{4}$ -in. 1,037 pounds.
$\frac{3}{4}$ -in. 3,347 pounds,	

76 large service boxes without covers,	5 granite blocks for service boxes,
167 small service boxes with covers,	1,300 pounds of solder,
20 new covers,	400 pounds of lead.

Drinking Troughs.

6 brass castings for inlets,	3 bowls,
5 brass nuts for inlets,	3 lamp posts,
8 cast iron standards for small troughs,	1 boiler standard for large trough-
3 bowl standards for small troughs,	

SEWERS.

The following sewers have been ordered by the City Council :

Union street, from Happy street to Washington street.

Waterman street, from Hope street to Brook street.

Waterman street, from Thayer street to Brook street.

The following sewers were completed during the last two months of 1876 :

*Eddy and Fulton streets, from Washington street to Dor-
rance street.*

Plane street, from Langley street to Lockwood street.

Ringgold street, from Kenyon street to Broadway.

Work on the following sewers was in a state of progress, as follows, on the 31st day of December, 1876 :

Angell, Gano and Pitman streets, from Arlington avenue to Cold Spring brook ; brick and pipe work completed ; some back-filling and street cleaning to be done.

Blackstone street, from near Eddy street to Allen's avenue ; a small amount of preliminary work done.

Martin street, from railroad bridge to Charles street ; about 100 feet of brick sewer work to be built.

Work on the following sewers, (completing the list ordered to be constructed by the Board of Water Commissioners,) had not been commenced on the 31st day of December, 1876 :

Dorrance street, from the head of the dock to the end of the pier.

Union street, from Happy street to Westminster street.

Waterman street, from Hope street to Brook street.

Waterman street, from Thayer street to Brook street.

After a full consideration of the advisability of continuing sewer construction during the winter months, the commissioners decided to go on with the building of the Blackstone street sewer, as the piles for the foundation were all driven, and there would be very little excavation of frozen ground, and some advantage of less pumping on account of the ice keeping out back-water. As there was but a small amount of sewer work ordered, and no urgent need of its being built immediately, the commissioners have decided not to proceed with the construction of any other sewers until the frost shall be out of the ground.

The account in relation to the following completed sewer is not yet in readiness for a statement of its cost :

Plane street, from Langley street to Lockwood street.

The accounts in relation to the following completed sewers have been made up and the cost of each is as follows :

<i>Friendship, West Friendship and Dudley streets, from Greenwich street to Plane street,</i>	-	\$14,243 47
<i>Waterman and Prospect streets, from the summit on Waterman street to College street,</i>	-	1,701 48
<i>Dorrance and Cove streets, from Westminster street to West Exchange street,</i>	-	\$34,013 89
<i>Eddy and Fulton streets, from Washington street to Dorrance street,</i>	-	852 43
<i>Ringgold street, from Kenyon street to Broadway,</i>	-	630 63
<i>Additional catch-basins on completed sewers, (since commencement,)</i>	-	2,392 39
<i>Additional work on sewers, (since commencement,)</i>	-	1,233 04
		<hr/> \$55,067 83

The total amount expended on account of
sewers during the last two months of 1876,
was

For construction,	-	\$19,607 42	
For maintenance,	-	1,686 04	
		<hr/>	\$21,293 46

The amount received during the last two
months of 1876, sewer department, all of which
was paid to the City Treasurer, was - \$169 00

Sixty drain-layer's licenses were in force December 31, 1876.

The following table exhibits the length and sizes of sewers constructed under the present system:—

Size in Inches.	Kind.	Year.						Total.
		1871.	1872.	1873.	1874.	1875.	1876.	
40x60	Brick.	.....	.....	2,854.46	.....	.....	.....	2,854.46
38x57	do	.....	.....	495.20	.....	.....	2,395.95	2,891.15
36x54	do	.....	.....	3,095.33	.....	.....	.....	3,095.33
34x51	do	594.50	.....	.....	.....	.....	.....	594.50
32x48	do	.....	.....	.....	410.85	.....	.....	410.85
30x45	do	.....	.....	.....	98.00	.....	2,170.35	2,268.35
28x42	do	1,599.11	.....	.....	2,190.67	.....	.....	3,789.78
26x39	do	.....	242.48	374.97	984.70	.....	.....	1,602.15
24x36	do	.....	.....	1,537.66	631.29	2,181.40	368.80	4,719.15
22x33	do	1,412.80	.....	.....	1,217.79	1,070.21	1,268.42	4,969.22
20x30	do	.....	.....	435.17	3,187.27	993.40	1,628.92	6,244.76
18x24	do	482.00	.....	.....	.....	.....	.....	482.00
66	do	.....	.....	1,562.60	.....	.....	2,462.51	4,025.11
54	do	.....	.....	.....	.....	.....	250.00	250.00
45	do	.....	.....	.....	1,314.70	.....	293.02	1,607.72
34	do	.....	.....	3.00	261.89	895.87	.....	1,160.76
22	do	.....	891.13	813.11	672.62	3,196.32	255.13	5,828.31
20	do	.....	245.98	2,072.00	1,952.41	3,255.68	1,781.48	9,307.35
18	do	.....	255.40	1,607.18	3,707.32	4,626.74	429.32	10,226.62
16	do	.....	455.22	2,202.39	.....	1,401.45	.....	4,059.06
18	Pipe.	46.00	27.00	229.55	825.71	.....	.....	1,128.26
15	do	111.00	1,402.98	1,819.63	7,220.95	4,565.00	2,418.59	17,538.15
12	do	1,828.75	8,253.23	17,602.68	39,199.38	33,037.28	8,680.31	108,601.63
8	do	.....	.....	219.30	.....	.....	.....	219.30
Totals in Feet.....		6,074.25	11,773.42	36,324.23	63,675.55	55,123.35	24,402.86	197,373.66
" " Miles		1.15	2.23	6.88	12.06	10.44	4.62	37.28
Catch-basins.....		71	83	231	508	380	126	1,449
Man-holes.....		34	115	346	700	613	233	2,041
Lamp-holes.....		.....	.....	.....	19	91	34	144
Private Drains laid,....		28	39	261	522	576	449	1,875

There was on hand on the first day of January last, the following sewer materials :—

Bricks.....	605 000
18-in. straight pipes.....	303 feet.
18-in.x 12-in. branch pipes.....	18 feet.
18-in.x 6-in. branch pipes.....	132 feet.
15-in. straight pipes.....	522 feet.
15-in.x 12-in. branch pipes.....	45 feet.
15-in.x 6-in. branch pipes.....	603 feet.
12-in. straight pipes.....	13,593 feet.
12-in.x 12-in. branch pipes.....	456 feet.
12-in.x 6-in. branch pipes.....	5,016 feet.
6-in. straight pipes.....	2,072 feet.

REPORT OF THE WATER COMMISSIONERS. 21

12-in. curved pipes.....	71
6-in. curved pipes.....	23
6-in. x 6-in. branch pipes.....	122
12-in. bevel connections.....	47
6-in. bevel connections.....	880
8-in. invert blocks.....	1,474
4-in. invert blocks.....	100
Inverts for 12-inch curves.....	16
Manhole inverts.....	206
Lamp-hole inverts.....	414
Iron man-hole frames and covers.....	378
Iron catch-basin covers.....	209
Iron catch-basin traps.....	239
Iron lamp-hole frames and covers.....	81
Iron sewer inlets—12-inch.....	9
Iron grated man-hole covers.....	1
Iron man-hole rods.....	30
Granite corner catch-basin stones.....	96
Granite side catch-basin stones.....	231

On the 19th of last month the commissioners reported a list of employés with the salary proposed to be paid to each on and after the first instant, upon which the Council did not take action in time to be printed in this report as required by ordinance.

During the short time the commissioners have been engaged in the duties of their office they have given much time to the work, and have endeavored to become familiar with all its details. The subject of a reduction in the price of water to large consumers is being considered, and many other matters of importance have received their attention.

Schedules of bills approved by the Board of Water Commissioners during the last two months of 1876; of receipts during the same time, and trial balances of ledgers, December 31, 1876, are hereunto appended and made parts of this report.

LODOWICK BRAYTON,
HENRY L. PARSONS,
NATHANIEL F. POTTER,

} Board of
Water Commissioners.

**SCHEDULE OF BILLS APPROVED BY THE BOARD OF WATER COM-
MISSIONERS FROM NOVEMBER 1, 1876, TO DECEMBER 30, 1876,
INCLUSIVE.**

1.	Thomas J. Hill, rent of wharf and pipe yard,	\$875 00
2	Boston Machine Co., license for use of fire hydrants as per agreement of former water commissioners,	7,000 00
3	Joseph Hillman, services as fireman at Hope station, (main- tenance,)	16 77
4	George W. Smith, stone cutting, steps of engine house at Pettacouset,	18 25
5	T. & W. Breck, one-third of rent of offices, (one-third charged to water works maintenance, and one third to sewer department,)	292 50
6	T. & W. Breck, one-third of rent of offices, (one-third charged to water works construction, and one-third to sewer department,) maintenance,	292 50
7	Thomas Phillips & Co., brass pipe and fittings, &c., meter de- partment, maintenance,	13 21
8	Pay-roll of laborers on pipe work, (discharged men,)	171 60
9	William H. Miller & Co., sharpening tools,	27 48
10	Fales, Jenks & Sons, taps and drills, hydrant spindles, &c.,	529 25
11	Fales & Jenks Machine Co., fire hydrants, hydrant boxes, water gates, &c.,	3,483 96
12	Fuller Iron Works, special castings,	564 16
13	Barker, Whitaker & Co., trumley scales and broad hatchet,	8 50
14	John Salisbury, labor on derrick guys,	9 94
15	G. & C. P. Hutchins, lantern globes,	4 50
16	Fales & Jenks Machine Co., repairs to hydrants, water gates, &c., (maintenance,)	84 26
17	G. & C. P. Hutchins, oil, lanterns, chimneys, &c., maintenance,	35 80
18	Wm. H. Miller & Co., repairing pipe wrenches, &c., "	4 93
19	R. S. Burrough & Co., oil,	85 85
20	Henry T. Root, brush and duster,	5 80
21	Hopkins & Pomroy, coal, &c.,	320 30
22	" " cement, teaming, &c.,	504 30
23	Pay-roll for month of November, viz. :— (names marked * being in part, balance charged in maintenance pay-roll and pay-roll sewer department.)	
	*J. Herbert Shedd, chief engineer, $\frac{1}{2}$ month,	166 67
	*Charles H. Pierce, assistant " $\frac{1}{2}$ "	62 50
	Charles H. Swan, " " 1 "	208 33
	John E. Bowen, " " 1 "	100 00
	Thomas L. Botts, " " 1 "	66 67
	Albert L. Bodwell, " " 1 "	66 67
	*Wm. F. Janes, service pipe " $\frac{1}{2}$ "	41 66
	George B. Francis, student, engineering de- partment, 1 month,	41 67
	Charles A. Harper, student, engineering de- partment, 1 month,	41 67
	Amounts carried forward,	\$795 84
		\$14,440 86

REPORT OF THE WATER COMMISSIONERS.

23

Amounts brought forward,		\$795 84	\$14,440 86
Walter F. Slade, service pipe clerk, 1 month,		83 33	
Andrew B. Purdy, superintendent of pipe work, one month,		166 67	
William H. Patterson, inspector on pipe line, 26 days,		104 0	
Henry M. Wilcox, inspector of service pipes, 1 month,		100 00	
Albert E. Angell, temporary assistant, engineering department, 26 days,		45 50	
Charles H. Wheeler, temporary assistant, engineering department, 26 days,		26 00	
Henry G. Dennis, inspector at foundry, 1 month,		125 00	
Richard M. Wood, clerk at pipe yard, 1 month,		83 33	
James Dalglish, mason at Hope reservoir, 19 days,		57 00	
Wm. Condry, mason at Hope reservoir, 18.6 days,		46 50	
Thomas Cahill, mason's tender at Hope reservoir, 17.5 days,		21 88	
*Lodwick Brayton, water commissioner, ½ month,		25 00	
*Nathaniel F. Potter, water commissioner, ½ month,		25 00	
*Clinton D. Sellew, secretary, ½ month,		50 00	
*Philip S. Chase, commissioners' clerk, ½ month,		37 50	
			1,792 55
24 Dexter Gorton & Co., lumber, labor, &c., at engine house at Petaconset,		272 33	
25 W. E. Barrett & Co., lawn grass seed,		20 00	
26 H. B. Bowen, hydrant bolts,		48 53	
27 Providence Block Co., double blocks,		18 50	
28 Yetter & Wack, sprinkling street front of 35 No. Main street, (maintenance,)		10 00	
29 Robert Morrow, horse hire by engineers, (maintenance,)		7 00	
30 A. C. Eddy & Studleys, spittoons, rubber boots, &c., "		11 65	
31 Tucker, Swan & Co., coal,		142 84	
32 Dexter Gorton & Co., labor, &c., at Petaconset, "		20 89	
33 Union Water Meter Co., water meters and repairing meters,		962 70	
34 Pay-roll for month of November, maintenance, viz. : (names marked * being in part, balance charged in construction pay-roll, and pay-roll sewer department.)			
*J. Herbert Shedd, chief engineer, ½ month,		166 67	
*Charles H. Pierce, assistant " ½ "		62 50	
*William F. Janes, service pipe " ½ "		41 67	
William T. Schneider, assistant engineer, 1 month,		100 00	
Edmund B. Weston, " " 1 month,		83 33	
William H. Turner, clerk, engineering department, 1 month,		100 00	
S. Horace Wheeler, inspector of service pipes, 1 month,		125 00	
Edward A. Moran, inspector of meters, 1 month,		100 00	
Amounts carried forward,		\$779 17	\$17,747 85

Amount brought forward.		\$48,262 81
47	H. G. Dennis, expenses to Burlington, N. J., inspecting pipes,	25 88
48	Dexter Gorton & Co., lumber, labor &c., covering pipes under bridges, &c.,	149 13
49	Wood & Winsor, brass tubing and fittings, &c.,	7 16
50	Hopkins & Pomroy, teaming, &c.,	95 32
51	Barker, Whitaker & Co., lead, lead pipe and tools,	1,136 92
52	Providence Gas Co., coke,	5 00
53	Fuller Iron Works, special castings,	138 83
54	William H. Miller & Co., sharpening tools, etc.,	70 87
55	Boston Machine Co., bell base for hydrant, (maintenance,)	5 50
56	E. Howard & Co., marble dial clock,	125 00
57	Providence Steam Engine Co., machinists' labor, etc., on Cornish engine, (maintenance,)	12 41
58	George L. Claffin & Co., oil, soap, etc., (maintenance,)	29 53
59	William H. Andrews, composition, repairs of Cornish engine, (maintenance,)	18 00
60	A. W. Page, tallow, (maintenance,)	19 86
61	Fales & Jenks Machine Co., water meters, (maintenance,)	28 40
62	Hopkins & Pomroy, coal, etc., maintenance,	311 42
63	Wood & Winsor, labor, pipe and fittings,	18 12
64	Moulton & Ingraham, stakes, (engineering,)	4 13
65	Harrison Hallet, painting fence around Hope reservoir, per agreement,	97 00
66	Dexter Gorton & Co., putting up clock at Hope engine house, etc., (maintenance,)	6 92
67	William H. Fenner & Co., oil cans, dripping pans, etc, (maintenance,)	33 93
68	D. D. Sweet & Co., doors for coal vaults, Hope engine house,	36 00
69	P. J. Kilkenny, labor, etc., at engine house at Pettaconset,	19 50
70	John H. Eddy & Co., palls, brooms, brushes etc., (maintenance,)	13 27
71	James H. Tower, constructing iron fence at Hope reservoir,	592 51
72	Fales & Jenks Machine Co., fire hydrants and hydrant boxes,	8,566 00
73	A. W. Page, tallow, (maintenance,)	4 50
74	R. S. Burrough & Co., oil,	81 85
75	Abbott Lawrence, expressage on meters,	18 75
76	Fales & Jenks Machine Co., repairing water meters, (maintenance,)	15 17
77	Union Water Meter Co., water meters and repairing meters, (maintenance,)	551 83
78	Pay roll for month of December, 1876:	
	(names marked * being in part, balance charged in maintenance pay roll and pay roll sewer department,)	
	*J. Herbert Shedd, Chief Engineer, $\frac{1}{2}$ month,	\$166 67
	*Charles H. Pierce, assistant engineer, $\frac{1}{2}$ month,	62 50
	Charles H. Swan, " " 1 "	208 33
	John E. Bowen, " " 1 "	100 00
	Albert L. Bodwell, " " 1 "	66 67
	*William F. Jones, service pipe " $\frac{1}{2}$ "	41 67
	George B. Francis, student engineering dept., 1 month,	41 67
Amounts carried forward,		\$687 51 \$55,501 52

Amounts brought forward,	\$687 51	\$55,501 52
Charles A. Harper, student engineering dept. 1 month	41 67	
Walter F. Slade, service pipe clerk, 1 month,	83 33	
Andrew B. Purdy, superintendent of pipe work, 1 month,	166 67	
Henry M. Wilcox, inspector of service pipes, 9-10 month,	90 00	
Henry G. Dennis, inspector at foundry, 2-5 month,	50 00	
Richard M. Wood, clerk at pipe yard, 1 month,	83 33	
*Lodowick Brayton, water commissioner, $\frac{1}{2}$ month,	25 00	
*Nathaniel F. Potter, " " $\frac{1}{2}$ "	25 00	
*Clinton D. Sellev, secretary, $\frac{1}{2}$ month,	50 00	
*Phillip S. Chase, commissioners' clerk, $\frac{1}{2}$ month,	37 50	
		\$1,340 01
79 Pay roll for month of December, 1876, maintenance: (names marked * being in part, balance charged in construction pay roll, sewer department.)		
*J. Herbert Shedd, chief engineer, $\frac{1}{2}$ month,	\$166 67	
*Charles H. Pierce, assistant engineer, $\frac{1}{2}$ month,	62 50	
*William F. Janes, service pipe engineer, $\frac{1}{2}$ month,	41 67	
William T. Schneider, assistant engineer, 1 month,	100 00	
Edmund B. Weston, assistant engineer, 1 month,	83 33	
William H. Turner, clerk, engineering department, 1 month,	100 00	
S. Horace Wheeler, inspector of service pipes, 1 month,	125 00	
Edward A. Moran, inspector of meters, 1 month,	100 00	
Alexis C. Miller, keeper of Hope reservoir, 1 month,	76 00	
Jephtha Baker, keeper of Sockanosset reservoir, 1 month,	76 00	
Simeon Noell, pumping engineer, Pettaconset, 1 month,	133 33	
John Hamilton, fireman, Pettaconset, 1 month,	85 00	
John Quinn, pumping engineer, Hope station, 1 month,	125 00	
Marcus E. Sherman, pumping engineer, Hope station, 1 month,	100 00	
Michael Hamill, fireman, Hope station, 1 month,	65 00	
Judson Davis, " " " 1 "	65 00	
*Lodowick Brayton, water commissioner, $\frac{1}{2}$ month,	25 00	
*Nathaniel F. Potter, " " $\frac{1}{2}$ month,	25 00	
*Clinton D. Sellev, secretary, $\frac{1}{2}$ month,	50 00	
*Phillip S. Chase, commissioners' clerk, $\frac{1}{2}$ month,	37 50	
Thomas C. Gushee, " " 1 month,	100 00	
Jesse W. Coleman, " " 1 month,	50 00	
Frederic A. Arnold, inspector of water fixtures, 1 month,	100 00	
Albert C. Winsor, assistant inspector of water fixtures, 26 days,	78 00	
John Funnell, janitor, etc.,	55 48	
		\$2,025 48
80 Charles H. Pierce, paid for sundries, (maintenance,)		40 88
81 " " " "		6 57
		\$58,914 46

RECEIVED FROM NOVEMBER 1, 1876, TO DECEMBER 30, 1876, IN-
CLUSIVE, AND PAID TO THE CITY TREASURER.

1876.

November	4.	Of William T. Schneider, for sundries, . . .	11 00
"	7.	Of Eliza Tetlow, for laying water pipes in New Fenner avenue, Cranston, . . .	300 00
"	11.	Of Cochituate Water Works, for iron screw posts, . . .	12 06
"	13.	Of John Smurthorst, for three months' rent of farm in Warwick, purchased of Miss Patience W. Chace, to December 30, 1876, . . .	43 75
"	14.	Of City of Providence, Department Public Buildings, for labor and materials, . . .	590 76
"		Of City of Providence, Highway department, for one grated inlet, . . .	7 87
"		Of City of Providence, Sewer department, for sewer expenses, . . .	2,450 41
"	23.	Of City of Newton, for special castings, . . .	22 21
December	1.	Of Providence Steam Mill, for cast iron water pipe, . . .	10 54
"		Of Daniel F. Burlingame, for temporary boarding house at Pettaconset, . . .	60 00
"		Of City of Providence, Brook street commissioners, for cast iron water pipe, . . .	13 19
"	18.	Of Israel B. Mason, J. F. & A. Comstock and others, for labor and materials, . . .	432 21
"	22.	Of Providence County Court House, for labor and materials, . . .	98 64
"	23.	Of City of Providence, Sewer department, for services of engineers, &c., . . .	11,087 00
"	30.	For setting and repairing meters during the two months, . . .	427 53
"		For laying service pipe during the two months, . . .	179 50
"		For penalties during the two months, . . .	6 00
"		For water meters during the two months, . . .	1,938 70
"		For water during the two months, . . .	6,756 55
			<hr/> \$24,447 92

TRIAL BALANCE OF LEDGER, DECEMBER 30, 1876.

DR.

CONSTRUCTION.

<i>Providence Water Works, for Construction:</i>	\$4,470,877 55	
<i>Providence Steam Engine Co.,</i>		
(For payments, etc., on account of High Service Pumping Engine. When the account is settled, this amount, together with the balance paid, will be charged to "Construction.")	52,093 10	
		\$4,522,970 65
<i>A. & W. Sprague Manufacturing Co.:</i>		
(Due from said company on account of grading a portion of Reservoir avenue, as per the written agreement of the company.)	2,500 00	
<i>R. O. Peck,</i>	71 77	
<i>Ponemah Mills,</i>	124 27	
<i>Samuel A. Irons,</i>	444 56	
		3,140 60
<i>City Treasurer:</i>		
(Payments to him for receipts for materials, labor, engineering services on sewers, other expenses incurred by Water Works for sewers, &c.,	312,273 82	
		\$4,838,385 07

MAINTENANCE.

<i>Providence Water Works, for Maintenance,</i>	206,777 98	
<i>City Treasurer, (paid him receipts for labor and materials, water meters, rents, &c.,)</i>	9,325 17	
<i>City Treasurer, (total amount of receipts for water,)</i>	619,455 43	835,558 53
		\$5,673,943 60

CR.

<i>McNeals & Archer,</i>	1,460 00	
<i>Penalties,</i>	564 00	
<i>Water,</i>	619,455 43	
<i>Approved Bills,</i>	5,052,444 17	
		\$5,673,943 60

SCHEDULE OF BILLS APPROVED BY THE BOARD OF WATER COMMISSIONERS
SEWER DEPARTMENT, FROM NOVEMBER 1, 1876, TO DECEMBER 30, 1876,
INCLUSIVE.

1	Pay-roll, construction account, for two weeks, ending November 4, 1876, (laborers.)		\$2,584 44
2	Pay-roll, maintenance account, for two weeks, ending November 4, 1876, (laborers, maintenance.)		364 22
3	Providence Water Works, salaries and office expenses, &c.,		759 29
4	Hopkins & Pomroy, cement, carting bricks, teaming, &c.,		1,086 35
5	Albert Dalley & Co., lumber,		96 69
6	E. W. Pierce & Co., oil, meal, &c.,		16 47
7	J. W. & J. J. Newman, reservation, sewer in Ship and Dyer streets,		105 38
8	Leach & Co., " " Atwell's avenue,		63 85
9	Patrick Smith, " " Pond street,		23 37
10	T. & W. Breck, one-third of rent of offices, (one-third charged to water works, maintenance, and one-third to water works, construction.)		292 50
11	William H. Miller & Co., blacksmith's work on tools,		9 58
12	Barker, Whitaker & Co., tools, &c.,		172 64
13	Fuller Iron Works, iron sewer castings,		1,037 66
14	Solomon Thornton, horse-hire, engineering department,		65 00
15	Akron Sewer Pipe Association, sewer pipes,		578 52
16	Hopkins and Pomroy, teaming,		207 90
17	Pay-roll, construction account, for two weeks, ending Nov. 18, 1876, (laborers,)	1,689 03	
18	Pay-roll, maintenance account, " " " "		341 76
19	Schooner Pointer, freight of invert blocks, (charged to G. W. Rader & Co.,)		13 72
20	Robert Morrow, horse-hire, engineering department,		66 00
21	Allen Aldrich, salary as superintendent of cleaning and repairs, (main- tenance,)		100 00
22	Pay-roll, month of November, 1876, (commissioners, engineers, clerks, &c., names marked * being in part, balance charged on water works, maintenance and construction pay-rolls.)		
	*J. Herbert Shedd, chief engineer, $\frac{1}{2}$ month,	383 33	
	*Charles H. Pierce, ass't. " $\frac{1}{2}$ " "	125 00	
	Howard A. Carson, " " 1 " "	250 00	
	Otis F. Clapp, " " 1 " "	208 33	
	Leprilete Sweet, 2d., " " 1 " "	83 33	
	William M. Brown, Jr., " " 1 " "	83 33	
	Edwin P. Dawley, " " 1 " "	83 33	
	Frank B. Ferris, " " 1 " "	66 67	
	William H. Olmsted, " " 1 " "	66 67	
	Alfred E. Martin, student, engineering department, 1 month,	41 67	
	William Applin, clerk, " " " "	83 33	
	Irvin H. Potter, " " " 11 days,	24 75	
	George H. Slade, temporary assistant, " " 99 hours,	39 60	
	Amount carried forward,	\$1,489 34	\$9,672 37

Amount brought forward,	\$1,459 34	\$9,672 37
George W. Winsor, Jr., temporary assistant, engineering department, 26 days,	39 00	
Edward C. Reynolds, temporary assistant, engineering department, 11 days,	16 50	
Daniel C. Stone, engineer of private drains, 1 month,	83 38	
Rencellaer B. S. Hart, inspector of private drains, 1 month,	80 00	
Thomas R. Belcher, inspector on sewers, 1 "	100 00	
William H. Kelly, testing cement, 23 days,	51 75	
*Lodowick Brayton, water commissioner, 1 "	50 00	
*Nathaniel F. Potter, " 1 "	50 00	
*Clinton D. Sellew, secretary, 1 "	100 00	
*Philip S. Chase, commissioners' clerk, 1 "	75 00	
Leonard N. Austin, Jr., " 1 "	75 00	2,309 82
23 Solomon Thornton, horse hire, engineering department,	29 00	
24 Allen Aldrich, " " " " (maintenance,)	54 50	
25 Henry H. Healy, " " " " "	6 50	
26 Fuller Iron Works, iron sewer castings, "	493 43	
27 Henry D. Griswold, powder, fuse and caps, .	121 50	
28 H. A. Carson, paid for sundries, .	10 73	
29 Charles H. Pierce, " " " "	6 32	
30 Pay-roll, month of November, 1876, (laborers,)	155 00	
31 Albert Tripp & Co., making and repairing profiles, centre ribs, &c.,	57 01	
32 A. C. Eddy & Studleys, rubber boots, &c.,	33 14	
33 " " " " (maintenance,)	21 50	
34 James J. Newman, striking hammers, .	6 45	
35 Pay-roll, construction account, for two weeks, ending December 2, 1876, (laborers,)	1,967 89	
36 Pay-roll, maintenance account, for two weeks, ending December 2, 1876, (laborers, maintenance,)	284 13	
37 Sloop Harvest, freight of sewer materials, (charged to G. W. Rader & Co.,)	23 91	
38 People's Concrete Co., concreting around catch-basins, &c.,	11 25	
39 Delany & Walsh, repairing tools, &c.,	8 50	
40 Hopkins & Pomroy, cement, carting bricks, &c.,	606 10	
41 Barker, Whitaker & Co., tools, &c.,	102 16	
42 Willard F. Inman, derrick, .	25 00	
43 Hallett & Mansr, repairing house, corner of Pitman and Gano streets, damaged during the construction of sewer, .	10 01	
44 William H. Miller & Co., blacksmith's work on tools, .	36 97	
45 Albert Dalley & Co., lumber, .	316 91	
46 Grant Brothers, sharpening tools, &c.,	27 29	
47 William H. Miller & Co., blacksmith's work on tools, (maintenance,)	7 84	
48 Wood & Winsor, pipe and fittings, &c., (maintenance,)	5 38	
49 Pay-roll construction, account, for two weeks ending Dec. 16, 1876, (laborers,)	2,133 70	
50 Henry Blundell, agent, labor, &c., on fountain pipe, .	23 30	
51 E. W. Pierce & Co., oil, .	4 50	
52 Allen Fire Department Supply Co., flexible pipe, (maintenance,)	5 00	
53 G. W. Rader & Co., invert blocks, .	245 07	
54 James Lawrence, filing saws, &c., .	5 25	
55 T. H. Read & Co., oil, &c., .	40 08	
56 Pay-roll, maintenance account, for three weeks ending Dec. 23, 1876, (laborers,)	356 31	
(maintenance,)	8 84	
57 H. A. Carson, paid for sundries, .	96 00	
58 Robert Morrow, horse-hire, engineering department, .		
59 Allen Aldrich, salary as superintendent of cleaning and repairs, (maintenance,)	100 00	
Amount carried forward, .		\$19,333 86

REPORT OF THE WATER COMMISSIONERS.

31

	Amount brought forward,		\$19,338 86
60	Pay-roll, month of December, 1876, (commissioners, engineers, clerks, &c., names marked * being in part, balance charged on water works, maintenance and construction pay rolls.)		
	*J. Herbert Shedd, chief engineer, $\frac{1}{2}$ month,	333	33
	*Charles H. Pierce, assistant " $\frac{1}{2}$ "	125	00
	Howard A. Carson, " " 1 "	250	00
	Otis F. Clapp, " " 1 "	208	88
	Leprilte Sweet, 2d., " " 1 "	83	33
	William M. Brown, Jr., " " 1 "	83	33
	Edwin P. Dawley, " " 1 "	83	33
	William H. Olmsted, " " 1 "	66	67
	Alfred E. Martin, student, engineering department, 1 month,	41	67
	William Aplin, clerk, engineering department, 1 "	83	33
	Daniel C. Stone, engineer of private drains, 1 "	88	33
	Rencellaer B. S. Hart, inspector of private drains, 4-31 "	10	33
	Thomas R. Belcher, inspector on sewers, 1 month,	100	00
	*Lodowick Brayton, water commissioner, $\frac{1}{2}$ "	50	00
	*Nathaniel F. Potter, " " $\frac{1}{2}$ "	50	00
	*Clinton D. Sellew, secretary, $\frac{1}{2}$ "	100	00
	*Philip S. Chase, commissioners' clerk, $\frac{1}{2}$ "	75	00
	Leonard N. Austin, Jr., " " 1 "	75	00
		\$1,901	97
61	Henry Staples & Co., tarred paper,		6 86
62	Charles H. Pierce, paid for sundries,		5 37
63	" " " " (maintenance,)		5 40
64	Allen Aldrich, horse-hire, engineering department,		40 00
			<hr/> \$21,298 46

RECEIVED BY THE BOARD OF WATER COMMISSIONERS, SEWER DEPARTMENT, FROM NOVEMBER 1, 1876, TO DECEMBER 30, 1876, INCLUSIVE, AND PAID TO THE CITY TREASURER.

1876.

November	1	Of J. F. Read, for cleaning sewer connection,	\$2 00
	11	" Fletcher Manufacturing Co., for cleaning sewer connection,	25 00
	18	" J. L. Lincoln, for cleaning sewer connection,	2 50
		Steamer Empire State, for filling boilers, tanks, &c., with Pawtuxet water,	18 00
	23	" Thomas J. Hill, for cracked sewer pipe,	17 20
	27	" E. C. Baker, for cleaning sewer connections,	4 00
December	1	" Union Railroad Co., for labor at barn on Thurber's avenue,	20 00
	2	" Thomas Phillips & Co., for cleaning drain at 61 Weyboset street,	10 00
	4	" F. W. Babcock, for cleaning sewer connections,	5 00
	8	" John B. Wood, for labor on Covelands,	29 00
	15	" Dyerville Manufacturing Co., for labor and materials,	5 50
	22	" Providence County Court House, for testing cement,	20 00
		" " " " " " " "	10 00
			<hr/> \$169 00

REPORT OF THE WATER COMMISSIONERS.

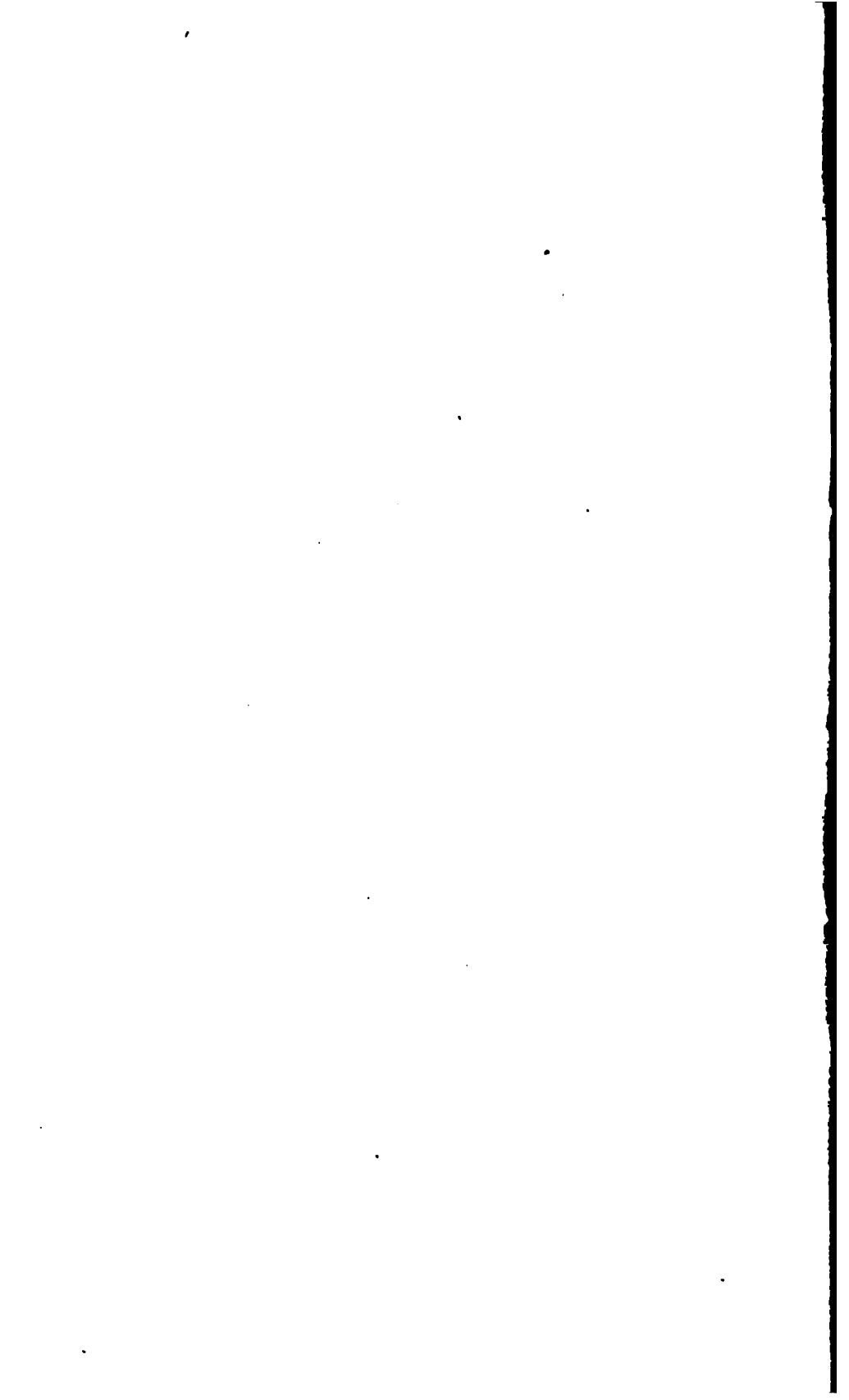
33

TRIAL BALANCE OF LEDGER, SEWER DEPARTMENT, DECEMBER 30, 1876.

	Dr.	
Salaries and office expenses,	\$22,541 02	
Books, stationery, etc.,	54 18	
Inspection of connections,	8,446 04	
Tools,	5,492 61	
Printing,	3,170 72	
Testing cement,	100 00	
Sewer pipes, rings, covers, etc.,	15,626 27	
Inspection of sewer pipe,	200 00	
Bricks,	6,443 46	
Catch-basin stones,	7,172 46	
Catch-basin covers,	518 14	
Catch-basin traps,	384 55	
Manhole frames and covers,	3,578 87	
Lamphole frames and covers,	350 87	
Grated covers,	19 02	
Invert blocks,	1,164 34	
Iron sewer connections,	29 87	
Iron rods,	13 93	
Sheet piling,	983 68	
Stones from Brook street sewer,	2,088 31	
Carting stones from sewers to Cove lands,	1,932 62	
Shed for storing material,	382 19	
City Treasurer,	11,330 68	
Catch-basins in Exchange street and Exchange place,	671 20	
Catch-basins in Hope street,	533 06	
Catch-basin in Park street,	144 36	
Catch-basin in Benefit street at Thomas street,	132 24	
Catch-basin corner of Canal and Meeting streets,	86 23	
Catch-basins corner of Hopkins and South Main streets,	246 63	
Sewer in Blackstone street, extension to Allen's avenue,	68 37	
“ “ Angell, Gano and Pitman streets,	9,160 87	
“ “ Martin street, from railroad bridge to Charles street,	2,196 52	
“ “ Plane street, from Langley to Lockwood street,	749 09	
John Gillen,	15 30	
G. W. Rader & Co.,	23 91	
A. D. Smith & Co.,	166 63	
Completed sewers,	\$89,509 81	
Maintenance of sewers,	42,382 69	
Engineering department, for horse hire,	2,388 85	
“ “ “ books, stationery, etc.,	215 33	
“ “ “ printing,	667 98	
“ “ “ instruments,	209 50	
“ “ “ salaries,	2,774 16	
		<u>\$1,045,168 65</u>

Cr.

Approved bills, \$1,045,168 65



1878.]

CITY DOCUMENT.

[No. 11.]

SECOND ANNUAL REPORT
OF THE BOARD OF
WATER COMMISSIONERS,
OF THE
CITY OF PROVIDENCE,
MARCH 4, 1878,
AND
REPORT OF THE ENGINEER AND SUPERINTENDENT.



PROVIDENCE:
J. A. & R. A. REID, PRINTERS TO THE CITY.
1878.

1878.]

CITY DOCUMENT.

[No. 11.]

SECOND ANNUAL REPORT
OF THE BOARD OF
WATER COMMISSIONERS,

With compliments of the

BOARD OF WATER COMMISSIONERS,
CLINTON D. SELLEW,
Secretary.



PROVIDENCE:
J. A. & R. A. REID, PRINTERS TO THE CITY.
1878.

1878.]

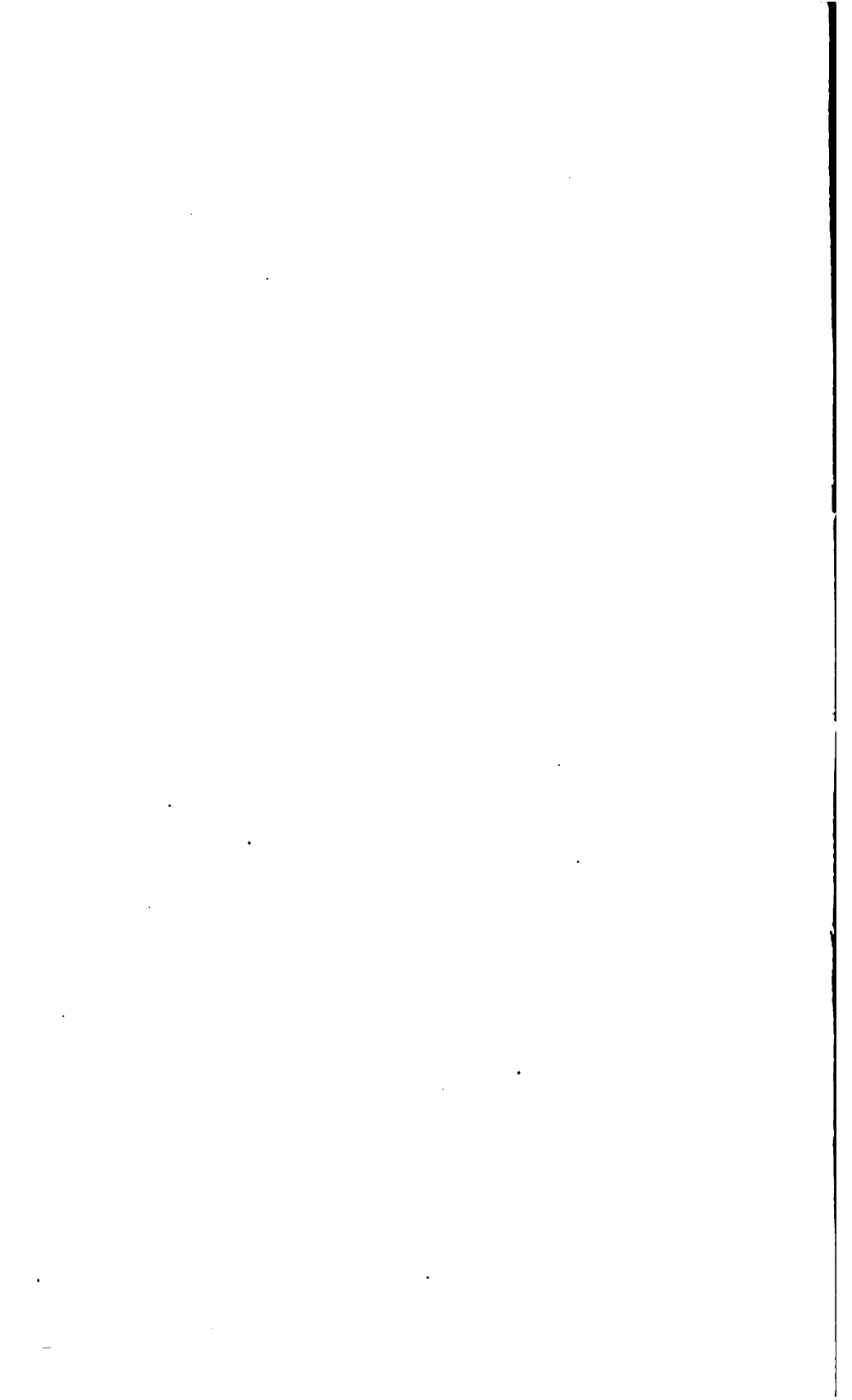
CITY DOCUMENT.

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SECOND ANNUAL REPORT
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MARCH 4, 1878,
AND
REPORT OF THE ENGINEER AND SUPERINTENDENT.



PROVIDENCE:
J. A. & R. A. REID, PRINTERS TO THE CITY.
1878.



ORGANIZATION
OF THE
PROVIDENCE WATER WORKS.

BOARD OF WATER COMMISSIONERS.

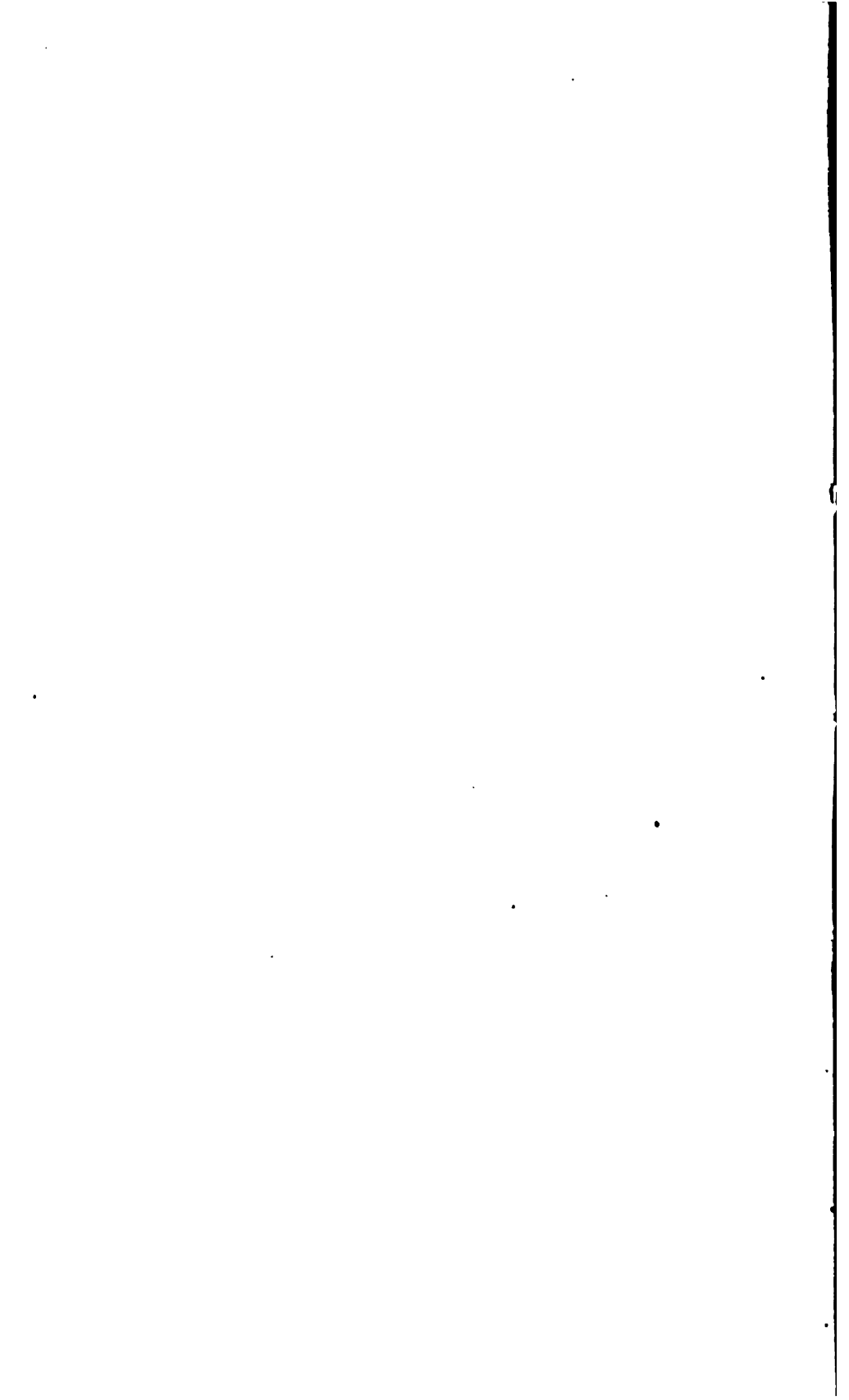
LODOWICK BRAYTON, PRESIDENT,
HENRY L. PARSONS,
NATHANIEL F. POTTER.

SECRETARY OF THE BOARD OF WATER COMMISSIONERS.

CLINTON D. SELLEW.
Office No. 35 North Main Street.

CITY ENGINEER AND SUPERINTENDENT.

SAMUEL M. GRAY.
Office No. 35 North Main Street.



REPORT.

BOARD OF WATER COMMISSIONERS' OFFICE, }
Providence, R. I., March 4th, 1878. }

TO THE HONORABLE THE CITY COUNCIL :

The Board of Water Commissioners, elected under an Ordinance of the City Council, passed October 19th, 1876, respectfully present their second annual report : —

The resignation of J. Herbert Shedd as Chief Engineer received by the Board January 15th, 1877, was accepted March 10th, 1877.

Samuel M. Gray, City Engineer, was, on the 13th day of March last, requested to take charge of the Providence Water Works as Superintendent.

The farm in Warwick, purchased of Richard U. Rhodes and wife, has been leased to John Smurthest, for two years, from March 1st, 1877, at an annual rent of two hundred (200) dollars, payable quarterly in advance.

The farm in Warwick, purchased of Miss Patience W. Chace, has been leased to John Smurthest, for two years, from March 31st, 1877, at an annual rent of one hundred and fifty (150) dollars, payable quarterly in advance.

The lease of the "Gardiner" farm to John Manning, for the year ending March 25th, 1878, was cancelled, and so much of the pasturage and grass on said farm as lies outside the road around Sockanosset reservoir was let to H. M. & A. C. Gardiner, for the season of 1877, for the sum of sev-

enty-five (75) dollars. The pasturage and grass on said farm has been leased to Henry W. Barnes, for one year from April 1st, 1878, for the sum of one hundred (100) dollars.

On the 10th day of July last, the offer of Tucker, Swan & Co., to furnish twelve hundred (1200) tons egg coal, delivered as required at Pettaconset Pumping Station, for the sum of three $\frac{90}{100}$ (3.90) dollars per ton, and three hundred (300) tons stove coal, delivered at Hope Pumping Station, for the sum of three $\frac{68}{100}$ (3.68) dollars per ton, the delivery in each case to be completed on or before July 1st, 1878, was accepted. It was estimated that the above quantities, with the amount on hand, would be sufficient for a year's supply.

The reversionary right in the Aldridge farm, so called, at Pettaconset, being the farm whereon is located the pumping station, has been purchased by the city for the sum of twenty-five hundred (2500) dollars. This purchase has settled a long existing controversy between the owners and the city, and will enable the latter to sell or exchange any portion, not needed for water works purposes, and give a perfect title of the same.

During the year the wharf leased of the Point Street Iron Works has been occupied by the Commissioners, who are now able to accommodate, to a limited extent, other departments of the city with wharfage facilities.

April 6th, 1877, the Commissioners received a petition from William W. Hoppin and others asking for a reduction of the rate for water for running elevators, and on May 21st, 1877, a petition of the Providence and Stonington Steamship Company, D. S. Babcock, President, asking for a reduction in the rates charged to said Company. November 10th, 1877, a petition of the Providence and Stonington Steamship Company and other large takers, which had been presented to the City Council, asking for a reduction in the price charged to large consumers, was received, the same having been referred to the

Commissioners by the Common Council on the recommendation of the Committee on Water.

During the year the subject referred to in the above mentioned communications was fully and carefully considered, and on the 31st day of December that portion of the Schedule of Water Rates relating to measured or estimated water, and which fixed the price at three cents per one hundred gallons, was amended to read as follows :

FOR MEASURED OR ESTIMATED WATER.

Where the consumption of water, through a single tap, amounts annually to \$300.00 or less, per 100 gallons, - .03

Where the consumption of water exceeds in amount the sum of \$300.00 annually, through a single tap, a discount of 20 per cent. on the excess over said \$300.00 will be allowed and deducted from the amount due for the fourth quarter.

Provided, however, that in no case where a meter is used shall the annual charge be less than \$10.00, which minimum annual charge will be payable in advance.

A change has been made in the rules whereby all plumbers' licenses now expire on the 31st day of December in each year.

WATER PIPES.

The following statement shows the lengths of pipes laid during the year 1877 ; the sizes of the pipes, and where laid :

16-INCH.

In Thurber's avenue and Valley street, - 1,108.8 feet.

12-INCH.

In Chalkstone, Fenner, Manton and Thurber's avenues, - - - - - 3,857.2 feet.

8-INCH.

In Brook, Camp, Eddy, McKenna, Oxford, Plane, Point and Smith streets, and in Douglas and Elmwood avenues, - 8,627.73 feet.

6-INCH.

In Abbott, Bolander, Bower, Bridge, Bond, Cargill, Clark, Clemence, Coles, Colfax, Courtland, Creighton, Dahlia, DeLaine, Esten, Eutaw, Fillmore, Forest, French, Front, Fruit, Fulton, Gallup, Gano, Grosvenor, Hardenburg, Harold, Hylstead, Jones, Keene, Linden, Linton, Lloyd, Manning, Mathew, McDonough, Monroe, Nichols, Norfolk, Parsonage, Peace, Plane, Quince, Sampson, Sayles, Seymour, Sherburne, Stampers, Swan, Thompson, Towner, Thayer, Transit, Trenton, Updike, Vanderwater, Valley, Veazie, Wiley and Willard streets; in first street west of Gano street, and first street east of Ives street; in Carington, Linwood, Pavilion, Reservoir, Wayland and West Elmwood avenues; in Webster avenue, Johnston; in Dean Place, and in Roger Williams Park, - - 38,162.11 feet.

4-INCH.

At Pipe Yard and in Roger Williams Park, - 643 feet.
 Total, - - - - - 52,398.84 feet.
 or 9.92 miles.

Statement of sizes and lengths of pipes laid since the commencement of the work :

36-inch,	- - - - -	10,084 feet.
30-inch,	- - - - -	59,076 feet.
24-inch,	- - - - -	23,942 feet.
20-inch,	- - - - -	6,604 feet.
16-inch,	- - - - -	27,120.8 feet.
12-inch,	- - - - -	42,858.2 feet.
10-inch,	- - - - -	10,507 feet.
8-inch,	- - - - -	104,883.73 feet.

6-inch,	-	-	-	-	-	-	-	474,828.11 feet.
4-inch,	-	-	-	-	-	-	-	643 feet.
Total,	-	-	-	-	-	-	-	760,546.84 feet.
or 144.04 miles.								

FIRE HYDRANTS.

Sixty-six hydrants were set during the year 1877, one in each of the following locations :

Armington avenue, north side, 236 feet west of Pemberton street.

Bower street, north side, opposite east line of Grosvenor street.

Bridge street, east side, opposite south line of Farthing street.

Brook street, north-west corner of Shamrock street.

Camp " north-east corner of Evergreen street.

" " " " " Forest "

Cargill " south-east " " West "

Chalkstone avenue, north side, 850 feet east of Bradley street.

Chalkstone avenue, north side, opposite west line of Bergen street.

Chalkstone avenue, north-west corner of River avenue.

Coles street, north-west corner of Thompson street.

Colfax street, north side, 340 feet east of Broad street.

Courtland street, south-west corner of Tell street.

Creighton street, north side, about half way between Brown and Prospect streets.

Dahlia street, east side, 235 feet south of Cranston street.

Douglas avenue, north-east corner of Vanderwater street.

Eddy street, east side, opposite north line of Aldrich street.

Eddy street, east side, opposite north line of Nebraska street.

Eddy street, east side, opposite north line of Railroad street.

Elmwood avenue, west side, opposite north line of Bartlett street.

Elmwood avenue, west side, opposite entrance to Roger Williams Park.

Fenner avenue, north-east corner of Sampson avenue.

Front street, north-west corner of Ann street.

Front street, south-west corner of Gano street.

Front street, north side, about half way between East and Ives streets.

Fruit street, north-east corner of Orchard street.

Gallup street, north side, about 255 feet east of Prairie avenue.

Gano street, north-east corner of Amy street.

Gano street, east side, 150 feet south of Bower street.

Grosvenor street, east side, 165 feet north of Front street.

Hardenburg street, east side, about half way between Sarah and Crown streets.

Harold street, south-east corner of Prescott street.

Hylstead street, east side, about 190 feet north of Pavilion avenue.

Jones street, north side, about half way between Bond and Bradford streets.

Keene street, north side, 240 feet east of Brown street.

Linton street, north side, about half way between Academy avenue and Canton street.

Linwood avenue, north side, about 454 feet east of Cranston street.

Lloyd street, south-west corner of Brown street.

Manton avenue, west side, 25 feet south of Dyerville Manufacturing Company's Office.

Manton avenue, west side, about 380 feet north of Dyerville Manufacturing Company's Office.

Manton avenue, west side, about 807 feet north of Dyerville Manufacturing Company's Office.

McDonough street, north side, near Stonington Railroad.

McKenna street, east side, opposite north line of Darling street.

Nichols street, south side, 280 feet west of Nash lane.

Oxford street, north-east corner of Harriet street.

Parsonage street, north-west corner of Lake street.

Pavilion avenue, north-west corner of Towner street.

Peace street, south side, about 380 feet west of Broad street.

Peace street, south side, about 580 feet east of Greenwich street.

Plane street, north-west corner of Colwell street.

Sayles street, north side, opposite west line of French street.

Seymour street, north side, about 208 feet west of Plane street.

Sherburne street, north side, about 343 feet east of Eddy street.

Sherburne street, north side, 320 feet east of Plane street.

Stampers street, west side, 110 feet north of Olney street.

Thurber's avenue, north side, opposite west line of Hylstead street.

Thurber's avenue, north side, about 280 feet west of Prairie avenue.

Transit street, south side, about half way between Governor and Ives streets.

Udike street, south-east corner of Whitmarsh street.

Valley street, south side, 104 feet east of Eagle street.

" " " 146 " " Turner street.

" " " opposite east line of Harold street.

" " " " " " Newark street.

Vanderwater street, north side, about 460 feet east of Douglas avenue.

Veazie street, east side, about 600 feet north of Douglas avenue.

Willard street, north side, about half way between Plane and Hawkins streets.

The total number of fire hydrants December 31st, 1877, was one thousand and seventy.

WATER METERS.

There were in use at the close of the year, the following water meters :

KIND.	SIZES.							TOTALS.
	$\frac{1}{8}$ inch.	$\frac{3}{8}$ inch.	1 inch.	$1\frac{1}{8}$ inch.	2 inch.	3 inch.	4 inch.	
Ball & Fitts, Piston..	1,914	362	115	49	9	1	1	2,451
" " " Rotary.....				1		3	1	5
Worthington.....	166						1	167
Fales, Jenks & Sons..	323	216	23	4	11		3	580
	2,403	578	138	54	20	4	6	3,203

APPLICATIONS FOR WATER.

The total number of applications for a supply of water to December 31st, 1877, inclusive, was eighty-six hundred and sixty-five.

SERVICE STOPS.

The number of service stops opened to December 31st, 1877, inclusive, was seventy-seven hundred and eighty-nine.

The following table exhibits the number of service stops opened by months from the commencement to December 31st, 1877, inclusive:

MONTHS.	1871.	1872.	1873.	1874.	1875.	1876.	1877.
January.....		54	33	21	34	55	15
February.....		47	18	18	7	25	23
March.....		38	34	63	7	45	32
April.....		109	109	108	32	108	82
May.....		224	206	147	162	168	136
June.....		329	296	151	172	148	114
July.....		333	261	127	141	158	83
August.....		224	209	123	83	94	91
September.....		184	147	139	101	94	80
October.....		138	135	160	92	84	81
November.....		100	104	185	86	54	73
December.....	56	83	45	122	60	35	55
	56	1,863	1,596	1,364	977	1,068	865

During the year 1877, one hundred and eleven stops were closed for non-payment of bills, eighty-two of which were re-opened ; in seventy-five cases the bill and penalty of two dollars each were paid, and seven by reason of attendant circumstances were re-opened on payment of bills without penalty. Fourteen stops closed for non-payment previous to 1877, were re-opened ; the bills and penalty of two dollars each were paid in seven instances, and the remaining seven, by reason of attendant circumstances were re-opened on payment of bills without penalty.

Sixty-one stops closed for non-payment remained unopened at the close of the year.

Eighteen stops were permanently closed. One stop previously reported as permanently closed was re-opened.

Eleven stops were removed ; one of which was afterwards replaced.

At the close of the calendar year 1877, there were in use seventy-four hundred and twenty stops.

USES OF WATER.

Water was, on the 31st day of December last, supplied for the following uses :

5 armories ; 14 bakeries ; 37 banks ; 154 bar-rooms ; 3 bath-houses ; 128 boarding houses ; 1 bonnet bleachery ; 12 bottling establishments ; 28 building purposes ; 2 burying grounds ; 1 burnisher ; 2 car-houses ; 3 carriage depositories ; 4 chasers ; 37 churches ; 1 city barn ; 2 city bridges ; 1 city building ; 18 city drinking fountains ; 39 city drinking troughs ; 1,070 city fire hydrants ; 15 city fire steamer and hose stations ; 13 club rooms ; 14 coal yards ; 1 college ; 1 colored shelter ; 1 conservatory of music ; 4 convents ; 2 court-houses ; 1 decorator ; 1 Dexter asylum ; 3,041 dwellings of one family ; 3,578 dwellings of two families ; 341 dwellings of three families ; 424 dwellings of four families ; 58 dwellings of five families ; 67 dwellings of six families ; 8 dwellings of seven families ; 7 dwellings of eight families ; 1 dwelling of nine families ; 1 dwelling of ten families ; 1

dwelling of twelve families ; 3 dye houses ; 18 elevators ; 1 engine turner ; 7 engravers ; 2 enamel works ; 1 express carriage house ; 62 fire supplies, private ; 69 fountains, private ; 2 fountains, public ; 1 furrier ; 3,868 garden and street hydrants ; 4 gas holders ; 6 gold and silver refiners ; 5 gold and silver platers ; 2 grain elevators ; 62 green houses ; 24 halls ; 1 home for aged men ; 1 home for aged women ; 2 hospitals ; 17 hotels ; 1 infirmary ; 6 laundries ; 5 libraries ; 1 lithographer ; 24 lodging-houses ; 2 lumber dealers ; 1 mason.

Manufacturing establishments.—1 alarm till ; 3 beer ; 2 belt and picker ; 3 blank book ; 2 bleacheries ; 1 bologna sausage ; 2 boot and shoe ; 2 box ; 1 braiding works ; 3 brass foundries ; 2 breweries ; 1 brush ; 2 butt ; 11 carriage ; 2 cement pipe ; 1 chain ; 1 chemical ; 9 cigar ; 1 cigar box ; 20 cloak and dress ; 1 coffin ; 8 confectionery ; 1 corset ; 3 colorers of jewelry ; 9 cotton ; 2 crocus ; 1 cutlery ; 3 die sinkers ; 2 dye wood ; 1 emery wheel ; 4 enamellers of jewelry ; 1 eyelet ; 4 file ; 10 furniture ; 1 gas ; 1 gas burner ; 4 gas fixtures ; 1 gas stove ; 1 gear ; 3 hat ; 9 harness ; 4 ice cream and soda water ; 1 iron company ; 1 iron fence ; 10 iron foundries ; 1 Japan switch ; 1 jewelers' cards ; 106 jewelry ; 4 lapidaries ; 32 machinists ; 1 mowing machine ; 1 nail keg ; 2 oil ; 1 organ ; 1 paper box ; 1 paper collar ; 3 paper cop tube ; 1 pattern ; 4 patent medicine ; 1 pencil case ; 4 picture frame ; 2 paint works ; 2 pump ; 2 reed ; 1 rubber ; 1 rubber goods ; 1 rubber tubing ; 5 sash and blind ; 1 saw ; 2 screw ; 1 sheet iron ; 1 shell comb ; 2 shirt ; 3 silver ware ; 6 soap ; 1 spiral spring ; 1 starch ; 1 steam boiler ; 2 steam engine ; 1 stencil plate ; 1 stove ; 2 tanners ; 2 thread ; 3 tin ware ; 4 tool ; 2 top roll ; 1 wire work ; 7 woolen goods ; 1 yeast.

Markets.—56 fish ; 132 meat.

Mills.—2 drug and grain ; 4 flour and grain ; 11 planing. 4 motors ; 1 nickel plater ; 1 opera house ; 2 orphan asylums ; 9 organs ; 6 oyster houses ; 802 offices ; 10 photographers ; 10 printing establishments ; 10 plaster and stucco workers ; 18 plumbers ; 11 provision curers and packers ; 6 police stations ; 7 railroads ; 2 reading rooms ; 47 restaurants ; 1 roofer.

Saloons.—5 billiard ; 3 bowling ; 6 ice cream ; 27 lager beer ;

9 oyster. *Schools*.—1 boarding; 17 private; 41 public; 1 reform. *Shops*.—57 barber; 17 blacksmith; 2 carpenter; 4 cooper; 2 gunsmith; 1 junk; 23 paint; 19 shoemaker; 30 tailor; 5 tinmen; 4 slaughter houses. *Stables*.—6 hack; 47 livery; 391 private; 5 sale; 91 work. 1 state house; 13 steamboats; 13 steamships; 6 steam and gas pipe fitters. *Stores*.—2 agricultural implements; 51 apothecary; 1 auction; 4 book; 35 boot and shoe; 1 bread; 2 carpet; 3 carriage trimmings; 1 chemical; 10 cigar; 27 clothing; 17 confectionery; 1 crockery; 3 drug; 45 dry goods; 85 fancy goods; 15 flour and grain; 12 fruit; 14 furniture; 10 gents' furnishing goods; 188 grocery, retail; 18 grocery, wholesale; 18 hardware; 2 hide and leather; 2 hoop skirt; 12 house furnishing goods; 4 house paper; 3 iron and steel; 17 jewelry; 14 liquor; 1 lime and brick; 2 manufacturers' supplies; 36 millinery; 11 newspaper; 4 oil and paint; 3 paper and paper stock; 2 piano-forte; 9 produce, wholesale; 4 sewing machine; 4 stationery; 3 stove; 7 tea; 2 trunk; 1 toy; 1 umbrella; 1 wooden ware; 1 wool; 4 woollen goods. 1 State prison; 1 store house; 6 stone cutters; 1 theatre; 4 undertakers; 1 United States custom house building; 5 upholsterers; 5 urinals, public; 2 water boats; 1 wheelwright; 1 wood turner; 9 wood yards; 33 not classed.

The amount of expenditures on account of water works during the year 1877, was—

For construction and extension.

\$90,971 77

Classified as follows, viz :

Cast-iron water pipes	\$37,080	92
Laying water pipe.....	10,408	84
Fire hydrants, boxes, covers and bolts..	6,058	48
Service pipe.....	4,517	30
Stop valves, boxes and covers.....	4,052	48
Laying service pipes.....	3,923	16
Hoist pumping engine, No. 2, balance..	3,064	83
Special castings.....	2,518	62
Wharf expenses, rent.....	\$1,937	50
expenses.... ..	367	62
Rent of offices	2,305	12
Engine house at Pettaconset.....	2,072	78
	1,515	89

Clerks' salaries.....	1,599 52
Superintendence of pipe work and service stops.....	1,471 71
Public drinking fountains and troughs ..	1,323 83
Taps and stops.....	1,185 72
Horse and wagon account, keeping, shoeing, &c.....	1,071 40
Labor on and carting pipes.....	1,045 58
Commissioners' salaries.....	809 68
Hope engine house.....	682 97
Horse shed at Pettaconset.....	580 70
Removal to Point street wharf.....	566 83
Secretary's salary.....	533 36
Tools.....	274 62
Inspection of pipes.....	160 00
Sundries.....	110 02
Printing and advertising.....	88 44
Books, stationery, &c.....	54 12
Hope reservoir grounds.....	50 83
Engineering department, for salaries to March 10, 1877.....	1,704 02
	<hr/>
	\$90,971 77

For maintenance, - - - - \$71,592 18
 Classified as follows:

PETTACONSET PUMPING STATION.

Coal and wood.....	\$6,143 47
Engineers.....	2,627 52
Firemen.....	2,240 72
Sundries.....	1,833 83
Oil and tallow.....	651 85
Labor on fuel.....	422 60
Cornish pumping engine and boilers.....	3,098 44
Care of grounds, grading, &c.....	1,259 05
Repair of buildings.....	917 80
Worthington pumping engine.....	394 87
Stand pipe.....	38 42
Superintendence at Pettaconset and Sockanosset.....	965 29
	<hr/>

\$20,593 36

SOCKANOSSET RESERVOIR.

Keeper's salary.....	\$852 00
Care of grounds, gate houses, &c.....	346 89
	<hr/>
Amount carried forward.....	\$1,198 89

REPORT OF THE WATER COMMISSIONERS.

17

Amount brought forward.....	\$1,198 89	
Keeper's house.....	51 30	
	<hr/>	\$1,250 19

HOPE PUMPING STATION.

Coal and wood.....	\$2,735 20	
Engineers.....	2,500 81	
Firemen.....	1,457 83	
Sundries.....	701 44	
Oil and tallow.....	294 02	
Lights.....	600 74	
Concreting driveways.....	432 50	
Pumping engine No. 2.....	131 40	
Engine house, repairs and cleaning....	220 26	
	<hr/>	\$9,074 20

HOPE RESERVOIR.

Keeper's salary.....	\$ 839 50	
Care of grounds, repair of steps, &c.....	804 91	
	<hr/>	\$1,644 41

PIPE LINE.

Superintendence of pipe line and service stops.....	\$1,488 91	
Repairs.....	2,919 43	
Thawing pipes.....	36 41	
Change of grades.....	268 42	
	<hr/>	\$4,713 17

COMMISSIONERS' OFFICE.

Clerks' salaries.....	\$3,816 65	
Examining water fixtures and collecting.	1,898 51	
Commissioners' salaries.....	1,484 68	
Secretary's salary.....	966 64	
Rent of offices.....	813 55	
Janitor's salary.....	584 14	
Printing and advertising.....	393 80	
Books, stationery, &c.....	341 07	
Office furniture.....	173 06	
Gas.....	79 48	
	<hr/>	\$10,551 58

MISCELLANEOUS.

Water meters, and setting and repairing meters.....	\$16,167 43	
Taxes.....	4,254 43	
Analyses of water.....	528 53	
	<hr/>	
Amount carried forward.....	\$20,950 39	

Amount brought forward.....	\$20,950 39	
Sundries.....	446 40	
Sprinkling streets.....	251 71	
Horse hire.....	223 63	
Real estate in Warwick, fence, &c.....	180 56	
Telegraph lines.....	159 38	
Hydrant test.....	127 73	
Experiments with water in pipes.....	122 74	
Superintendent's clerk.....	102 00	
Water privileges and real estate in Pawtuxet.....	11 75	
Engineering department, salaries to March 10, 1877.....	1,188 98	23,765 27
		<hr/> \$71,592 18
The amount of expenditures during the year 1877, was..		\$162,563 95
The total amount of expenditures to December 31, 1877, inclusive, was.....		5,215,008 12
The net cost of construction and extension for the year 1877, was.....		83,152 73
The net cost of construction and extension to December 31, 1877, inclusive, was.....		4,606,123 38
The net cost of maintenance for the year 1877, was.....		56,861 67
The net cost of maintenance to December 31, 1877, inclusive, was.....		263,439 60
The total amount of appropriations to December 31, 1877, was—		
For construction and extension.....	\$5,150,000 00	
For maintenance from October 1, 1876.....	150,000 00	\$5,300,000 00
		<hr/>
The unexpended balances December 31, 1877, were—		
For construction and extension.....	\$20,415 60	
For maintenance.....	64,576 28	\$84,991 88
		<hr/>
The amount received during the year 1877, all of which was paid to the City Treasurer, was.....		\$220,684 74

Classified as follows :

MAINTENANCE.

Water supplies.....	\$200,039 39
Water meters.....	11,038 60
Setting and repairing meters.....	3,116 95
Rents.....	699 50
Penalties.....	164 00
Old buildings at Sockanosset.....	40 00
Alterations caused by change of grades.....	16 00

Repairing fire hydrant in Johnston.....	16 00	
Repairing drinking trough.....	9 71	
Oil barrels at Pettaconset.....	8 25	
		\$215,148 40

CONSTRUCTION.

Labor and materials, laying water pipes.	\$3,572 23	
Labor and materials, laying service pipes.	1,709 96	
Wharfage.....	129 09	
Drain tile.....	61 25	
Lumber at Pettaconset.....	34 14	
Sundries.....	29 67	
		\$5,536 34
		\$220,684 74

The total amount received for water to December 31, 1877, inclusive, was.....	\$819,494 82
The amount of all receipts to December 31, 1877, inclusive, was.....	\$1,161,739 16

The following is a statement of receipts for water, by months, from commencement to December 31st, 1877, inclusive.

MONTHS.	1872.	1873.	1874.	1875.	1876.	1877.
January.....		\$40,699 09	\$69,356 70	\$92,102 10	\$106,847 71	\$124,146 06
February.....	\$796 06	4,314 80	3,678 96	4,674 19	2,939 71	5,592 98
March.....	6,671 82	6,669 73	9,221 19	4,777 42	6,777 07	9,455 64
April.....	1,668 59	2,810 07	4,936 98	10,098 32	13,384 63	7,722 51
May.....	2,063 41	1,766 28	2,338 59	2,574 92	2,598 23	3,307 32
June.....	8,634 89	8,228 92	2,583 35	8,140 99	6,506 75	8,840 60
July.....	3,488 27	6,214 24	13,756 51	9,035 23	14,055 90	9,350 82
August.....	1,818 14	1,441 09	1,953 37	4,001 66	2,324 74	3,295 95
September.....	4,933 44	7,550 64	5,541 34	5,393 34	13,053 49	3,313 36
October.....	5,079 08	8,745 53	9,097 95	13,578 46	8,623 85	15,865 02
November.....	477 04	872 83	1,511 03	1,291 59	908 43	1,050 65
December.....	5,372 77	8,072 87	8,076 42	9,481 49	5,848 12	8,098 49
	\$41,003 51	\$97,886 09	\$132,052 39	\$165,144 71	\$183,868 73	\$200,039 39

The estimate made for maintenance of the works, for the financial year ending September 30th, 1878, was seventy-five

thousand dollars. The Commissioners now believe this amount will be sufficient.

The amount needed for construction and extension will depend almost wholly upon the amount of work ordered by your honorable body.

SEWERS.

The following statements show the sewers ordered during the year 1877; the sewers completed during the same time and the cost of each:

SEWERS ORDERED AND COMPLETED DURING THE YEAR 1877, AND THE COST OF EACH:

NAME OF STREETS.	BETWEEN WHAT POINTS.	DATE OF ORDER.	COST.
Arch street.....	From Gilmore street to connect with the sewer in Arch street.....	May 24, 1877.....	\$1,497 86
Carpenter street.....	From Courtland street to Marshall street.....	September 6, 1877...	986 01
Federal street.....	From Dean street to Bradford street.....	April 28, 1877.....	1,423 19
Friendship street.....	From the westerly line of the estate of J. C. Fanning to Beacon street.....	July 30, 1877.....	323 28
Gilmore street.....	From the summit in said street southerly to Arch street.....	June 4, 1877.....	569 06
Hammond street.....	From Gilbert street to High Street.....	September 17, 1877..	553 75
John street.....	From Neighbor's lane to Benefit street.....	May 24, 1877.....	858 33
Lleyd street.....	From about one hundred feet east of Hope street, to connect with sewer in Thayer street.....	October 15, 1877....	1,223 91
Manton avenue.....	From near Malden street to the Woonasquacket river.....	October 15, 1877...	4,534 86
Enggold street.....	From Broadway to Carpenter street.....	March 29, 1877.....	553 86
Thayer street.....	From Barnes street about two hundred feet northerly.....	October 11, 1877....	1,539 42
Union street.....	From Washington street about one hundred and sixty feet southerly.....	March 29, 1877.....	408 01
Union street.....	Southerly from Washington street, to be extended about forty feet.....	April 14, 1877.....	92 72
Vernon and Battery streets.....	From Pallas street to Carpenter street.....	July 12, 1877.....	1,769 80
West Clifford street.....	From Point street to Pearl street.....	March 29, 1877.....	1,597 94

SEWERS ORDERED PRIOR TO JANUARY 1, BUT COMPLETED
DURING THE YEAR 1877, AND THE COST OF EACH :

NAME OF STREETS.	BETWEEN WHAT POINTS.	DATE OF ORDER.	COST.
Angell, Gano and Pitman streets.	From Arlington avenue to Cold Spring brook.....	May 1, 1876.....	\$14,453 03
Blackstone street.....	From near Eddy street to Allen's avenue.....	April 27, 1876.....	10,029 01
Martin street.....	From railroad bridge to Charles street.....	October 19, 1876....	5,539 86
Plane street... ..	From Langley street to Lookwood street.....	October 30, 1876.....	2,251 30
Union street.....	From Happy street to Westminster street.....	December 14, 1876 ..	471 01
Waterman street... ..	From Hope street to Brook street.....	November 16, 1876..	2,772 36
Waterman street.....	From Thayer street to Brook street... ..	November 16, 1876 ..	580 24

CATCH-BASINS ORDERED BY THE CITY COUNCIL AND COMPLETED DURING THE YEAR 1877, AND STATEMENT OF THEIR COST :

LOCATION,	NO. OF BASINS.	DATE OF ORDER.	COST.
Gaspee street, opposite the State Prison.	Two.....	September 17, 1877..	\$184 16
Steeple street, corner of Canal street....	Two.....	September 17, 1877..	135 61

In addition to the above there was expended during the year 1877 :

For additional catch-basins on completed sewers, \$594 74
 For additional work on completed sewers, - - 114 66
 For Dorrance street over-flow, - - - - 52 94

The sewers ordered to be constructed in the Brook street district are not yet completed.

Work on the following sewers (completing the list ordered to be constructed by the Board of Water Commissioners,) had not, on the 31st day of December, 1877, commenced :

Bridgham street, from High street to Cranston street.

Dorrance street, from the head of the dock to the end of the pier.

Greene street, from Washington street to Westminster street.

The following table exhibits the length and sizes of sewers constructed under the present system :

Size in inches.	Kind.	YEAR.							Totals.
		1871.	1872.	1873.	1874.	1875.	1876.	1877.	
66x72	Brick.	....	....	....	....	....	....	530.64	530.64
40x60	do.	....	....	2,354.46	....	....	....	....	2,354.46
38x57	do.	....	....	495.20	....	....	2,395.95	....	2,891.15
36x54	do.	....	....	3,095.33	....	....	....	....	3,095.33
34x51	do.	594.50	....	....	....	....	....	....	594.50
32x48	do.	....	....	....	410.85	....	....	....	410.85
30x45	do.	....	....	....	98.00	....	2,170.35	647.78	2,916.13
28x42	do.	1,599.11	....	....	2,190.67	....	....	....	3,789.78
26x39	do.	....	242.48	374.97	984.70	....	....	....	1,602.15
24x36	do.	....	....	1,537.66	631.29	2,181.40	368.80	....	4,719.15
22x33	do.	1,412.89	....	....	1,217.79	1,070.21	1,268.42	....	4,969.31
20x30	do.	....	....	436.17	3,187.27	993.40	1,628.92	....	6,244.76
16x24	do.	482.00	....	....	....	....	....	....	482.00
66	do.	....	....	1,562.60	....	....	2,462.95	....	4,025.55
54	do.	....	....	....	....	....	250.00	....	250.00
48	do.	....	....	....	1,314.70	....	293.02	100.00	1,707.72
40	do.	....	....	....	....	....	....	566.25	566.25
36	do.	....	....	....	....	....	....	195.90	195.90
30	do.	....	....	....	....	....	....	349.17	349.17
24	do.	....	....	8.00	261.89	895.87	....	284.74	1,445.50
22	do.	....	891.13	813.11	672.62	3,196.32	265.13	1,663.30	7,491.61
20	do.	....	245.98	2,072.00	1,962.41	3,255.68	1,781.48	....	9,307.55
18	do.	....	255.40	1,507.18	3,507.32	4,526.74	429.38	361.90	10,587.92
16	do.	....	455.22	2,202.39	....	1,401.45	....	....	4,059.06
15	Pipe.	46.00	27.00	229.55	825.71	....	....	....	1,128.26
15	do.	111.00	1,402.98	1,819.63	7,220.95	4,558.00	2,418.59	538.90	18,077.05
12	do.	1,528.75	8,263.23	17,602.68	39,199.38	33,037.28	8,680.17	11,902.26	150,503.75
8	do.	....	....	219.30	....	....	....	....	219.30
Totals in feet.....		6,074.25	11,773.42	36,324.23	63,675.55	55,123.35	34,403.16	17,142.74	214,518.70
Totals in miles.....		1.15	2.23	6.88	12.06	10.44	4.62	3.24	46.62
Catch-basins.....		71	83	281	508	380	126	128	1,577
Man-Holes.....		34	115	346	700	613	283	163	2,204
Lamp-holes.....		....	....	....	19	91	34	12	156
Private drains laid..		28	39	261	522	576	449	383	2,368

The amount of expenditures, on account of sewers during the year 1877, was :

For construction, - - - - - \$56,454 37

Classified as follows :

Labor and materials, constructing sewers.....	\$44,991 77
Salaries and office expenses.....	3,247 96
Rent of wharf and pipe yard.....	2,084 33
Rent of offices.....	814 11
Inspection of connections.....	784 34
Removal to Point street wharf.....	624 95
Buildings at pipe yard.....	373 86
Books, stationery, &c.....	89 08

Printing.....	50 92
Engineering department to March 10th, 1877.....	3,393 05
	<u>\$56,454 37</u>

For maintenance, - - - - - \$12,099 69

Classified as follows :

Cleaning catch-basins and sewers.....	\$8,966 90
Superintendence of cleaning and repairs.	1,033 36
Cleaning and repairing old drains.....	830 44
Repairing new sewers.. ..	618 92
Building on Cove lands.....	616 49
Alterations caused by change of grades.	33 58
	<u>\$12,099 69</u>

Total, - - - - - \$68,554 06

The amount received by the sewer department, during the year 1877, all of which was paid to the City Treasurer, was - - - - - \$1,477 51

DRAIN-LAYERS.

Drain-layers' licenses were issued during the year 1877, as follows :

Peter T. Farrell, George M. Hunt,
Bernard Swift.

Three drain-layers' licenses were revoked, viz :

James Cassidy, Patrick Clarke,
Patrick Smith.

Two licensed drain-layers have deceased.

Fifty-eight drain-layers' licenses were in force December 31st, 1877.

SEWER ASSESSMENTS.

The following sewer assessments have been completed and certified to the City Treasurer :

<i>Arch street, from Gilmore street to connect with the sewer in Arch street,</i> - - -	<u>\$1,556 74</u>
Amount carried forward,	\$1,556 74

Amount brought forward, - - -	\$1,556 74
<i>Blackstone street, from the present terminus to Allen's avenue, - - -</i>	1,827 07
<i>Dorrance and Cove streets, from Westminster street to West Exchange street, - -</i>	6,131 98
<i>Eddy and Fulton streets, from Washington street to Dorrance street, - - -</i>	762 23
<i>Federal street, from Dean street to Bradford street, - - - - -</i>	922 50
<i>Gilmore street, from the summit southerly to Arch street, - - - - -</i>	721 91
<i>John street, from Neighbor's lane to Benefit street, - - - - -</i>	1,088 51
<i>Martin street, from the railroad bridge to Charles street, - - - - -</i>	1,470 19
<i>Pearl street, from Beacon street to Plane street, - - - - -</i>	2,587 78
<i>Plane street, from Langley street to Lockwood street, - - - - -</i>	1,567 63
<i>Ringgold street, from Broadway to Carpenter street, - - - - -</i>	471 10
<i>Ringgold street, from Kenyon street to Broadway, - - - - -</i>	525 20
<i>Union street, from Happy street to Westminster street, - - - - -</i>	342 75
<i>Union street, from Washington street southerly about 160 feet, - - - - -</i>	298 37
<i>Union street, from Washington street, southerly, extended to near Fulton street, - - -</i>	98 05
<i>Waterman street, from Thayer street to Brook street, - - - - -</i>	429 69
<i>Waterman street, from a point opposite easterly line of H. N. Campbell's estate, to Brook street, - - - - -</i>	2,025 93
<i>Waterman and Prospect streets, from summit in Waterman street to College street, - -</i>	1,216 31
<i>West Clifford street, from Point street to</i>	
Amount carried forward, - - -	\$24,043 94

Amount brought forward, - - -	\$24,048 94
<i>Pearl street, - - - - -</i>	1,463 47
<i>West Friendship, Friendship and Dudley streets, from Greenwich street to Plane street, - -</i>	10,505 66
	<hr/> \$36,013 07
Previously, - - - - -	471,281 91
Total, - - - - -	<hr/> \$507,294 98

EMPLOYES.

The following is a detailed statement of the salaries paid to the employees of the commissioners :

Clinton D. Sellow, secretary,	compensation, \$2,300 00 per annum.
Philip S. Chase, book-keeper,	1,700 00 " "
Thomas C. Guashee, clerk,	" 1,100 00 " "
William H. Turner, "	" 1,100 00 " "
Walter F. Slade, "	" 900 00 " "
Leonard N. Austin, Jr., "	" 850 00 " "
Jesse W. Coleman, "	" 700 00 " "
Frederic A. Arnold, examiner of water fixtures and collector,	" 1,100 00 " "
Albert C. Winsor, assist. ex'r. of water fixtures and collector,	" 875 00 " "
Andrew B. Pardey, superintendent of pipe work,	" 1,600 00 " "
S. Horace Wheeler, superintendent of service pipe work,	" 1,300 00 " "
William F. Jones, in charge of service stops,	" 900 00 " "
Edward A. Moran, superintendent of meter work,	" 1,100 00 " "
Richard M. Wood, clerk at pipe yard,	" 900 00 " "
William H. Patterson, foreman of pipe laying,	" 1,000 00 " "
William T. Schneider, supt. at Pettaconset and Sockanossset,	" 1,100 00 " "
Simeon Noell, pumping engineer at Pettaconset,	" 1,600 00 " "
William Harry, " " " "	" 1,000 00 " "
John Hamilton, fireman at Pettaconset,	" 1,000 00 " "
James Hamilton, " " "	" 2 00 per day.
Jeptha Baker, keeper of Sockanossset reservoir,	" 2 50 " "
John Quinn, pumping engineer at Hope station,	" 1,500 00 per annum.
Joseph F. Plant, " " " "	" 1,200 00 " "
Michael Hamill, fireman at Hope station,	" 65 00 per month.
Judson Davis, " " " "	" 65 00 " "
Alexis C. Miller, keeper of Hope reservoir,	" 2 50 per day.
Allen Aldrich, superintendent of cleaning and repairs of sewers,	" 1,100 00 per annum.
Edward Field, 2nd, superintendent's clerk,	" 350 00 " "

Trial balances of ledgers, December 31st, 1877, and the report of the Engineer and Superintendent are hereunto appended and made parts of this report.

L. BRAYTON,	}	Board of Water Commissioners.
HENRY L. PARSONS,		
N. F. POTTER,		

TRIAL BALANCE OF LEDGER, DECEMBER 31, 1877.

DR.

CONSTRUCTION.

<i>Providence Water Works, for Construction:</i>		\$4,606,123 38
<i>A. & W. Sprague Manufacturing Co.,</i>		
(Due from said company on account of grading a portion of Reservoir avenue, as per the written agreement of the company.)	\$2,500 00	
<i>Nelson W. Aldrich,</i>	10 00	
<i>William H. Low,</i>	31 79	
<i>G. & S. Owen,</i>	61 99	
<i>City of Providence, City Engineer's Department,</i>	1,258 67	
<i>Board of State Charities and Corrections,</i>	13 28	
<i>R. O. Peck,</i>	71 77	
<i>Providence County Court House,</i>	1 30	
		\$3,948 80
<i>City Treasurer:</i>		
(Payments to him for receipts for labor, materials, engineering services on sewers, other expenses incurred by Water Works for sewers, &c.,)		\$317,810 16

MAINTENANCE.

<i>Providence Water Works, for Maintenance,</i>	263,439 60	
<i>City Treasurer:</i>		
(Payments to him for labor and materials, water meters, rents, &c.,)	24,434 18	
<i>City Treasurer:</i>		
(Total amount of receipts for water,)	819,494 82	
		\$6,035,250 94

CR.

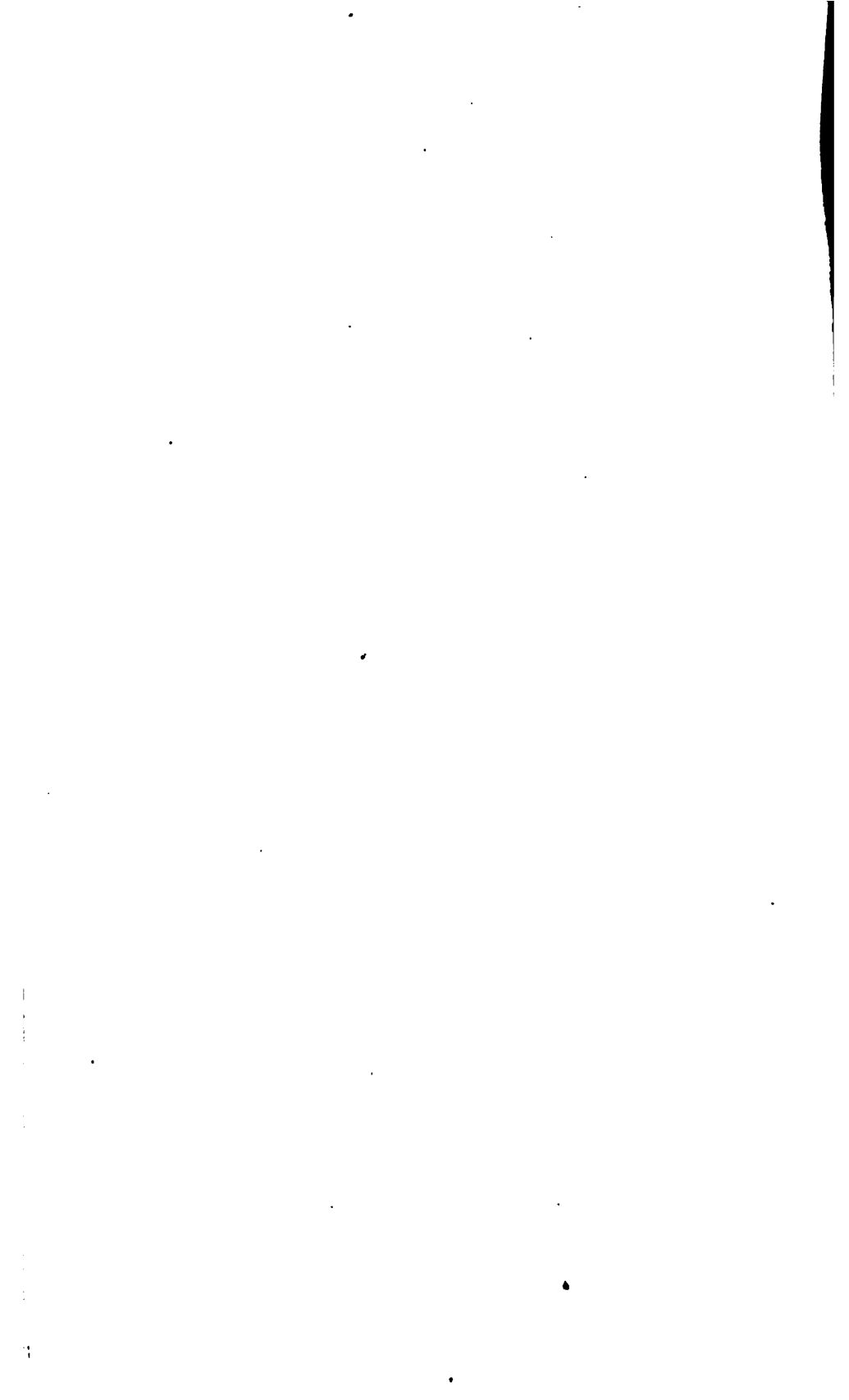
<i>Penalties,</i>	748 00	
<i>Water,</i>	819,494 82	
<i>Approved bills,</i>	5,215,008 12	
		\$6,035,250 94

REPORT OF THE WATER COMMISSIONERS.

27

TRIAL BALANCE OF LEDGER, SEWER DEPARTMENT, DECEMBER 31, 1877.

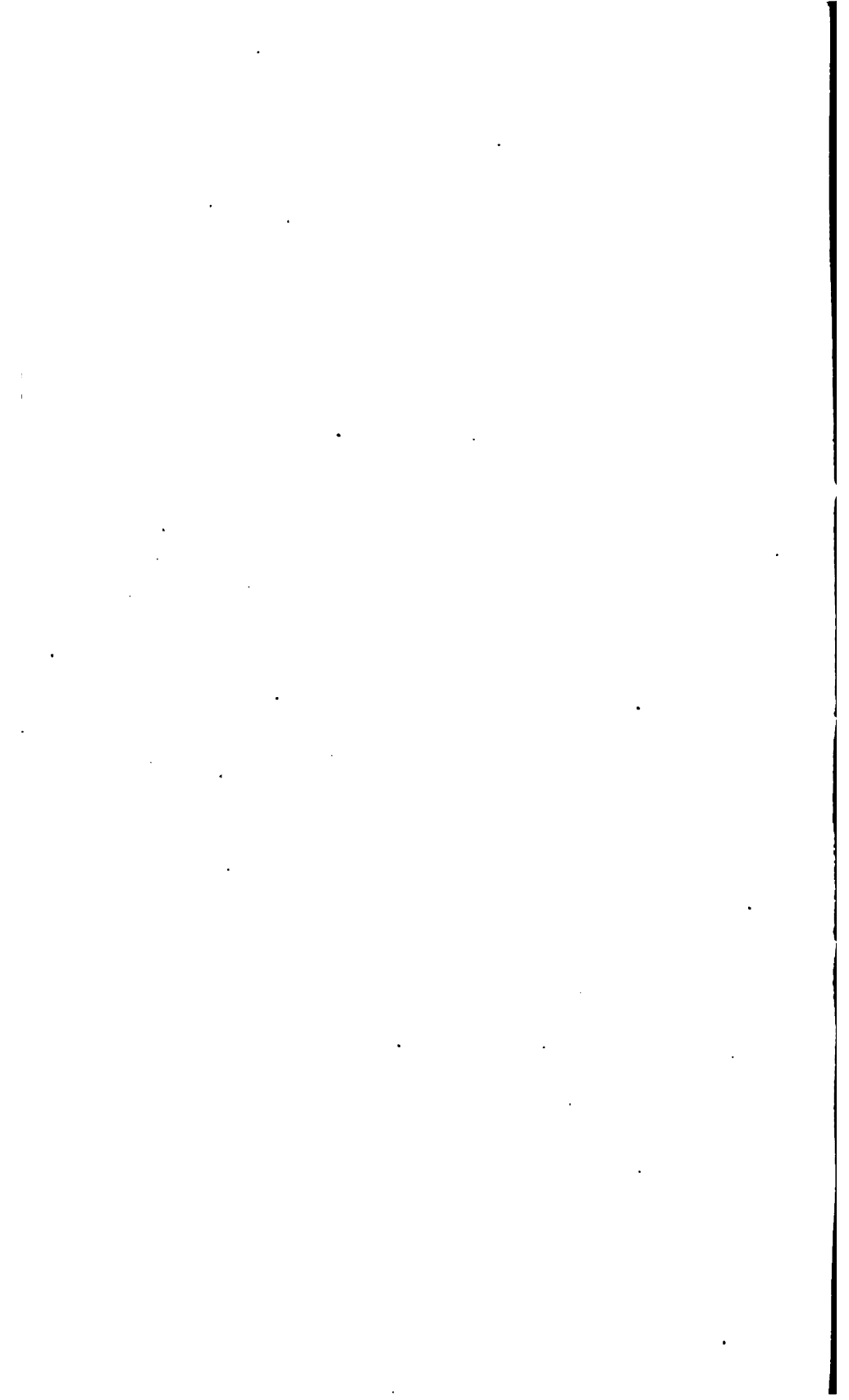
	DR.	
Salaries and office expenses,	-	\$29,630 29
Engineering department, to March 10, 1877,	-	3,614 84
Books, stationery, &c.,	-	143 21
Inspection of connections,	-	9,230 38
Tools,	-	4,007 79
Sheet piling,	-	165 03
Removal to Point street wharf,	-	624 95
Buildings at pipe yard,	-	756 05
Rent of wharf and pipe yard,	-	1,987 46
Printing,	-	3,221 64
Stones from Brook street sewer,	-	2,088 31
Carting stones from sewers to Cove lands,	-	1,932 62
Sewer pipes, rings, covers, &c.,	-	10,957 44
Bricks,	-	3,711 02
Catch-basin stones,	-	6,156 96
Catch-basin covers,	-	322 28
Catch-basin traps,	-	365 18
Man-hole frames and covers,	-	2,634 50
Lamp-hole frames and covers,	-	320 96
Invert blocks,	-	2,141 28
Iron sewer connections,	-	21 04
Iron rods,	-	13 93
Grated covers,	-	51 63
Paving stones,	-	73 50
City Treasurer,	-	12,808 19
Catch-basins in Exchange street and place,	-	752 11
" " near Nash lane bridge,	-	197 23
" " corner Canal and Steeple streets,	-	133 11
" " in Gaspee street,	-	178 96
" " corner Benefit and South Court streets,	-	144 16
" " at Roger Williams Park,	-	103 24
" " corner Benefit and Jenckes streets,	-	82 33
" " corner Thurber's and Prairie avenues,	-	25 18
" " in Doyle avenue,	-	398 02
Additional catch-basins,	-	192 86
Additional work on sewers,	-	86 49
Sewers in Brook street district, east of Ives street,	-	8,163 52
" " Brook street district, west of Ives street,	-	6,005 96
" " Manton avenue, from Malden street to the river,	-	4,795 96
" " Lloyd street, from near Hope to Thayer street,	-	1,226 31
" " Thayer street, from Barnes street northerly,	-	1,432 31
John Gillen,	-	15 30
Providence County Court House,	-	10 00
Providence Water Works,	-	14 55
Union Railroad Co.,	-	43 76
Atlantic DeLaine Co.,	-	24 12
Catch-basins on old drains,	-	1,302 15
Completed sewers,	-	936,177 99
Maintenance of sewers,	-	54,332 21
		<hr/>
		\$1,113,717 71
	CR.	
Approved bills,	-	\$1,113,717 71



R E P O R T

OF THE

ENGINEER AND SUPERINTENDENT.



REPORT.

CITY ENGINEER'S OFFICE,
PROVIDENCE, February 14, 1878. }

To the Board of Water Commissioners :

GENTLEMEN :—Agreeable to Section 7 of an ordinance approved March 10, 1877, I herewith submit the following report :

WATER WORKS.

Water pipes have been laid in the following streets during the year :

Name of Street.	Between what Points.	Date Laid.	Length Laid.				
			4 inch.	6 inch.	8 inch.	12 inch.	16 inch.
Abbott street...	Camp street and Bolander street.	June 11.	Spec. cases.	283.80	....	....	....
Aborn gangway	Weybosset street and Pine street.	Dec. 31.	....	286.00	....	....	....
Bolander street.	Abbott st. and Grandview street.	June 18.	....	463.00	....	....	....
Bower street.	Ives street and Gano street.	Sept. 22.	....	600.50	....	....	....
Bridge street.	Wickenden st. and S. Main street.	Oct. 6.	....	412.00	....	....	....
Bond street.	Mountain street and Jones street.	Oct. 17.	....	121.00	....	....	....
Brook street.	Pike street and India street.	July 7.	....	....	641.00	....	....
Chalkstone ave.	River avenue, easterly.	July 16.	....	888.00	....	....	....
"	River avenue, westerly.	July 21.	....	....	....	1847.00	....
Carrington ave.	East avenue, westerly.	Aug. 23.	....	571.00	....	....	....
Courtland st.	Geisler street and Penn street.	Aug. 30.	....	508.00	....	....	....
Coles street.	Brook street and East street.	Nov. 20.	....	638.00	....	....	....
Creighton st.	Brown street, westerly.	Oct. 29.	....	182.00	....	....	....
Clark street.	Towner street and Hylstead st.	Nov. 1.	....	480.50	....	....	....
Cargill street.	Carpenter st. and Fountain street.	Nov. 1.	....	420.50	....	....	....
Colfax street.	Broad street, easterly.	Dec. 7.	....	346.00	....	....	....
Clemence street.	Broad st. and Westminster street.	Dec. 19.	....	....	....	....	....
Camp street.	Larch st. and Evergreen street.	June 9.	....	....	699.95	....	....
Delaine street.	Manton avenue and Sampson st.	May 23.	....	690.50	....	....	....
Dahlia street.	Cranston street, easterly.	July 13.	....	507.00	....	....	....
Dean place.	Dean street, southerly.	Aug. 17.	....	163.00	....	....	....
Douglas ave.	Eaton street, easterly.	Aug. 20.	....	....	....	....	....
"	Admiral street, westerly.	Aug. 20.	....	....	620.80	....	....
"	Vanderwater street, westerly.	Aug. 20.	....	....	....	....	....
Esten street.	Orms street and Smith street.	Aug. 22.	....	428.20	....	....	....
Eutaw street.	Atwell's avenue and Spruce st.	Nov. 7.	....	228.00	....	....	....
Eddy street.	Thurber's avenue and Aldrich st.	May 23.	....	....	1568.32	....	....
Elmwood ave.	Roger Williams Park, northerly.	Dec. 1.	....	....	3601.00	....	....
Fulton street.	Dorrance street and Eddy street.	May 8.	....	219.95	....	....	....
Forest street.	Extension.	June 1.	....	109.50	....	....	....
Fruit street.	Broad street and Orohard street.	July 25.	....	513.80	....	....	....
French street.	Sayles street, southerly.	Sept. 3.	....	97.80	....	....	....
Front street.	Brook street and Gano street.	Dec. 27.	....	1970.40	....	....	....
Fillmore street.	Wiley street, southerly.	Oct. 15.	....	24.66	....	....	....
Carried forward.			11,410.11	7021.07	1847.00	....	....

Name of Street.	Between what Points.	Date Laid.	Length Laid.				
			4 inch.	6 inch.	8 inch.	12 inch.	18 inch.
	Brought forward.....		Spec. cases.	11410.11	7021.07	1347.00	...
Fenner ave.....	New Fenner ave. and Sampson av	May 19.....	.....	.....	.....	161.50	.....
Gano street.....	Bower street and Front street	Nov. 16.....	.....	1,568.78	.....	.....	.....
Gano street.....	Pitman street, southerly,	.....	.....	433.00	.....	.....	.....
Grosvenor st.....	Front street and Bower street	Oct. 2.....	.....	594.00	.....	.....	.....
Gallup street.....	Prairie avenue, easterly	Oct. 8.....	.....	433.00	.....	.....	.....
Hardenburg st.....	Eaton street and Bailey street	Aug. 20.....	.....	989.50	.....	.....	.....
Hylstead street.....	Thurber's ave. and Pavilion ave.	Sept. 19.....	.....	618.70	.....	.....	.....
Harold street.....	Valley street and Allston street	Dec. 14.....	.....	742.50	.....	.....	.....
Jones street.....	Bond street, easterly	Oct. 17.....	.....	227.00	.....	.....	.....
Keene street.....	Extension.....	April 30.....	.....	489.00	.....	.....	.....
Lloyd street.....	Extension.....	May 1.....	.....	104.00	.....	.....	.....
Linwood ave.....	Cranston street, easterly	May 22.....	.....	607.00	.....	.....	.....
Linden street.....	Friendship street, easterly	July 28.....	.....	134.10	.....	.....	.....
Linton street.....	Academy ave. and Cranston st.	Sept. 20.....	.....	514.00	.....	.....	.....
Mathew street.....	Fillmore street, westerly	April 13.....	.....	853.40	.....	.....	.....
Manning street.....	Governor street and Ives street	May 3.....	.....	307.80	.....	.....	.....
Monroe street.....	Lester street and Perkins street	May 20.....	.....	259.80	.....	.....	.....
McDonough st.....	Norfolk street, westerly	Oct. 19.....	.....	137.00	.....	.....	.....
McKenna st.....	Whelden street, northerly	Aug. 24.....	.....	.....	827.00	.....	.....
Manton ave.....	Eagan street, westerly	May 15.....	.....	.....	.....	1688.00	.....
Nichols street.....	Nash lane and Walling street	Oct. 13.....	.....	880.00	.....	.....	.....
Norfolk street.....	Oak street and McDonough st.	Oct. 19.....	.....	270.00	.....	.....	.....
Oxford street.....	Prairie ave. and Harriet street	Dec. 6.....	.....	.....	260.16	.....	.....
Peace street.....	Greenwich street and Broad st.	May 11.....	.....	1,238.90	.....	.....	.....
Plane street.....	Thurber's ave. and Pavilion ave.	July 3.....	.....	941.40	.....	.....	.....
"	Potter's ave. and Sherburne st.	Sept. 14.....	.....	758.00	.....	.....	.....
"	Swan street and Oxford st.	.....	.....	.....	.....	.....	.....
"	Lockwood street, southerly	May 31.....	.....	.....	309.50	.....	.....
Point street.....	Extension.....	July 10.....	.....	.....	88.00	.....	.....
Pipe yard.....	Point street and wharf	July 11.....	440.00	.....	.....	.....	.....
Parsonage st.....	Point street and Lake street	July 27.....	.....	251.50	.....	.....	.....
Pavilion ave.....	Hylstead street and Towner st.	Oct. 31.....	.....	218.44	.....	.....	.....
Quince street.....	Fruit street and Oxford street	July 24.....	.....	304.00	.....	.....	.....
Roger Williams Park.....	Elmwood avenue, easterly	Dec. 4.....	.....	885.40	.....	.....	.....
Roger Williams Park.....	Distribution.....	Dec. 4.....	208.00	.....	.....	.....	.....
Reservoir ave.....	Adelaide ave., and R. R. bridge	Dec. 22.....	.....	207.00	.....	.....	.....
Sherburne st.....	Eddy street, easterly	May 18.....	.....	558.00	.....	.....	.....
"	Ocean street and Plain street	Sept. 10.....	.....	613.15	.....	.....	.....
Sampson street.....	Connection at Delaine street	May 23.....	.....	15.00	.....	.....	.....
Stamper street.....	Extension.....	June 19.....	.....	231.50	.....	.....	.....
Seymour street.....	Eddy street, westerly	June 21.....	.....	883.90	.....	.....	.....
Sayles street.....	French street, easterly	Sept. 3.....	.....	371.00	.....	.....	.....
Swan street.....	Eddy street and Plain street	Sept. 12.....	.....	432.50	.....	.....	.....
Smith street.....	Extension.....	April 13.....	.....	.....	122.00	.....	.....
Transit street.....	Governor street and Ives street	July 10.....	.....	525.50	.....	.....	.....
Trenton street.....	" " " "	Dec. 21.....	.....	519.00	.....	.....	.....
Towner street.....	Pavilion ave. and Clark street	Nov. 1.....	.....	353.00	.....	.....	.....
Thompson st.....	Front street and Wickenden st.	Dec. 28.....	.....	320.00	.....	.....	.....
Thayer street.....	Extension.....	Oct. 26.....	.....	108.00	.....	.....	.....
Thurber's ave.....	Eddy street and Towner street	Sept. 17.....	.....	.....	622.70	.....	.....
"	Broad street and Prairie avenue	Sept. 8.....	.....	.....	.....	701.30	.....
Udlike street.....	Moore street and Whitmarsh st.	Nov. 3.....	.....	507.00	.....	.....	.....
Vanderwater st.....	Douglas avenue, northerly	July 31.....	.....	735.00	.....	.....	.....
Vearle street.....	Douglas ave. and Douglas ave.	Aug. 11.....	.....	1,955.50	.....	.....	.....
Valley street.....	Atwell's avenue and Eagle street	Dec. 18.....	.....	1,302.30	.....	.....	.....
Valley street.....	Eagle street and River avenue	Dec. 17.....	.....	.....	.....	401.30	.....
Wayland ave.....	Humboldt avenue, northerly	May 4.....	.....	277.20	.....	.....	.....
Webster avenue (Johnston).....	Lexington ave. and Plainfield st.	June 29.....	.....	686.00	.....	.....	.....
W. Elmwood av.....	Potter's ave. and Daboll street	July 23.....	.....	579.75	.....	.....	.....
Willard street.....	Bishop street, westerly	Sept. 1.....	.....	217.00	.....	.....	.....
Wiley street.....	Fillmore street, westerly	Oct. 15.....	.....	254.00	.....	.....	.....
First st. west of Gano street.....	Front street and Bower street	Sept. 20.....	.....	684.00	.....	.....	.....
First st. east of Ives street.....	Front street and Bower street	Oct. 6.....	.....	547.00	.....	.....	.....
	Totals.....		643.00	35162.11	8637.78	3667.30	138.90

Included in the foregoing are the following cut pipes, branches, etc. :

	4 inch.	6 inch.	8 inch.	12 inch.	16 inch.	Totals.
Cut pipes.....	2.	180.	30.	9.	2.	208.
Branches.....	2.	120.	51.	20.	4.	197.
Curved pipes.....	2.	46.	10.	...	2.	60.
Gates.....	2.	91.	11.	4.	...	108.

Following is a statement of repairs made during the year on distribution pipes, hydrants and street sprinklers, also the hydrants set :

MONTHS.	LEAKS IN DIS- TRIBUTION.			REPAIRS.		WATER BLOWN OFF.	HYDRANTS SET.					
	Sizes of Pipe.			Hydrants.	Street Sprinklers.		Sizes of pipe where set.					Totals.
	6 in.	8 in.	10 in.				4 in.	6 in.	8 in.	12 in.	16 in.	
January.....				2		4						
February.....				2	7	2						
March.....	2			2		2						
April.....	1					3				1		1
May.....				5	25	7		6	3	3		12
June.....				4		8		3	2			5
July.....	2			8		9		6		2		8
August.....	3	1	1	28		8		4	2			6
September.....				2	1	12		6		1	2	9
October.....	4			1		6		8				8
November.....				2		4		5	1			6
December.....						1		9	1		1	11
Totals.....	12	1	1	54	33	66	....	47	9	7	3	66

In addition to the list of water pipes laid, there have been changed for grade on Pettis street, Waterman street, Front street, Hope street and East street, 1,925 feet of six-inch pipe.

Of the above hydrants repaired, fifty have been furnished with improved valves. Two hundred of the hydrants in use at this date have been supplied with the improved valve.

Of the street sprinklers repaired, twenty-five have been fur-

nished with the "Chapman Valve." One new one has been set during the year on Transit street, near South Main street.

Three four-inch hydrants have been set for special purposes.

The above work is in charge of Andrew B. Purdy.

SERVICE PIPE WORK.

WORK DONE IN 1877.

MONTHS.	SERVICES RUN.						LENGTH OF SERVICES RUN.							
	Sizes.					Total set.	Sizes.							
	$\frac{3}{8}$ in.	$\frac{1}{2}$ in.	$\frac{5}{8}$ in.	$\frac{3}{4}$ in.	1 in.		$\frac{1}{2}$ inch.	$\frac{5}{8}$ inch.	$\frac{3}{4}$ inch.	1 inch.	1 $\frac{1}{4}$ inch.	1 $\frac{1}{2}$ in.	Total lengths.	
January.....	..	3	2	..	..	5	....	22.8	14	....	....	..	36.8
February.....	3	10	..	..	..	13	42.3	126.8	....	....	....	..	169.1
March.....	12	31	..	2	..	45	229.2	447.5	....	28	....	..	704.7
April.....	16	58	17	..	..	91	259.1	911.3	311.5	....	....	..	1481.9
May.....	28	97	24	1	3	153	446.4	1423.7	372	7.8	61	..	2310.9	
June.....	23	63	13	2	..	101	397.5	1063.3	234.1	39.8	....	..	1734.7
July.....	18	45	5	3	..	71	290.3	697.1	63.8	47.0	....	..	1068.2
August.....	26	43	12	5	..	86	431.1	598.6	174.3	92.2	....	..	1296.2
September.....	10	54	16	..	2	82	210.7	878.7	281.3	34	....	..	1404.7
October.....	14	64	5	..	1	84	192.9	981.2	110.4	....	8.9	..	1293.4
November.....	15	52	11	..	..	78	194	643	152.5	....	....	..	969.5
December.....	8	51	9	..	2	70	113.3	885.3	170.5	....	44.3	7	1229.4
Totals.....	173	571	114	15	6	879	2776.8	8679.3	1884.4	248.8	114.2	7	13770.5	

Eleven service pipes have been removed for non-use during the year.

WORK DONE AND CHARGED TO PLUMBERS.

Twelve caps have been changed, and the mains tapped seventeen times to supply private pipes. Also have opened and back-filled two thousand three hundred and eighty feet of trenching, and furnished and run 1,518.9 feet of lead pipe of the following sizes :—

$\frac{1}{2}$ inch.	$\frac{3}{4}$ inch.	$\frac{1}{2}$ inch.	1 inch.	1 $\frac{1}{2}$ inch.	1 $\frac{1}{2}$ inch.	Total.
204.4	976.2	278.4	32.0	19.5	8.4	1518.9 feet.

and furnished and put in 122 $\frac{3}{4}$ -inch, 4 1-inch and 1 $1\frac{1}{2}$ -inch solder nipples.

DRINKING TROUGHS AND FOUNTAINS.

Large bowls of the boiler pattern have been set to take the place of the small iron ones in the following named places :

One at junction of Public and Greenwich streets, with drinking cup attached.

One at junction of Dyer street and Eddy street, to take the place of two small ones.

One at junction of Manton avenue and Atwell's avenue, moved from junction of Manton avenue and Amherst street.

And one on Wickenden street, between Brook street and Traverse street.

New drinking troughs have been set as follows :

One at junction of Point street and Friendship street.

One at junction of Angell street and South Angell street.

One at junction of Broadway and High street.

One at junction of Broad street and Eddy street.

One at junction of Admiral street and Douglas avenue.

One at junction of Reservoir avenue and Pontiac road.

One at corner of Amherst street and Steuben street, (small pattern).

One at corner of Cranston street and Potter's avenue.

DRINKING FOUNTAINS.

Drinking attachments have been put in at the following places :

Randall Square, drinking trough.

Junction of Benefit street and North Main street, drinking trough.

Butler avenue, opposite Irving avenue, lamp post.

Corner of Barnes street and Thayer street, lamp post.

Corner of Earle street and Greenwich street.

All of the iron drinking troughs received a coat of paint during the summer whenever the men could best be spared from the regular work.

The above work has been in charge of S. Horace Wheeler.

INVENTORY OF WATER WORKS MATERIAL, ON HAND AT
PIPE YARD, JANUARY 1st, 1878.

KIND.	CLASS.	SIZES IN INCHES.	Pieces on Hand.	RE- MARKS	KIND.	CLASS.	SIZES IN INCHES.	Pieces on Hand.	RE- MARKS
Pipe.	A	36	4	....	Pipe.	B	36	1	....
"	a ₂	36	4	....	"	B	30	4	....
"	A	24	23	....	"	b	30	2	....
"	A	12	445	....	"	b	30	1	broken spigot.
"	a ₂	12	8	....	"	B	24	5	....
"	A	8	471	....	"	B	20	12	....
"	a ₂	8	5	....	"	B	16	81	....
"	A	4	44	....	"	B	12	586	....
					"	B	10	24	....
					"	B	8	311	....
					"	B	6	375	....
Branch pipe.		30x30	1	....	Branch pipe.		16x8x8	1	....
"		30x24	1	....	"		16x8x6	2	....
"		30x20	1	....	"		16x6x6	1	....
"		30x16	1	....	"		12x12	5	....
"		30x12	1	....	"		12x10	1	....
"		30x10	1	....	"		12x8	17	....
"		30x8	1	....	"		12x6	16	....
"		30x6	2	....	"		12x8x8	1	....
"		30x24x12	1	....	"		12x8x6	1	....
"		30x12x8	1	....	"		12x6x6	4	....
"		30x8x8	1	....	"		10x8	5	....
"		30x8x6	1	....	"		10x6	4	....
"		24x24	1	....	"		10x6x6	2	....
"		24x16	1	....	"		10x8x6	1	....
"		24x12	1	....	"		10x8x8	1	....
"		24x10	1	....	"		8x8	19	....
"		24x8	1	....	"		8x6	12	....
"		24x6	1	....	"		8x8x8	3	....
"		24x8x8	1	....	"		8x8x6	1	....
"		24x8x6	1	....	"		8x6x6	1	....
"		20x16	1	....	"		8x4	2	....
"		20x12	1	....	"		6x8	41	....
"		20x10	1	....	"		6x6	58	....
"		20x8	1	....	"		6x8x6	4	....
"		20x6	1	....	"		6x6x6	10	....
"		20x10x8	1	....	"		6x6	4	Y
"		20x8x6	1	....	"		4x4	5	Flanged
"		20x6x6	1	....	Blow-off				
"		16x16	1	....	branch		30	1	....
"		16x12	1	....	"		24	1	....
"		16x10	2	....	Man-hole and				
"		16x8	20	....	appurten-		36	1	....
"		16x6	35	....	ances.		30	1	....
"		16x12x12	1	....	"		24	1	....

KIND.	SIZE.	Pieces on Hand.	KIND.	SIZE.		Pieces on Hand.	RE- MARKS.
				Total ft.	Size.		
Quarter turns.....	8	10	Curved pipe..	9.83	30	3	....
“	6	3	“	8.14	30	1	....
Eighth turns.....	12	3	“	8.90	30	1	....
“	10	4	“	8.60	30	1	....
“	8	5	“	6.83	30	1	....
“	6	1	“	8.93	24	3	....
Sixteenth turns....	10	3	“	8.92	24	8	....
“	8	7	“	7.54	24	1	....
“	6	3	“	6.58	24	2	....
Bevel hubs.....	12	11	“	6.90	24	1	....
“	10	3	“	5.24	24	1	....
“	8	15	“	....	24	1	Not m'rk'd.
“	6	18	“	8.72	20	2	....
Sleeves.....	36	1	“	7.74	20	1	....
“	30	29	“	6.81	20	1	....
“	24	12	“	4.92	20	2	....
“	20	3	“		16	4	Not m'rk'd.
“	16	1	.....				....
“	12	8					....
“	10	3	Caps and ap- purtenances..	For Size of Pipe. Inches.			....
“	8	17	Spigot caps...	16		2	....
“	6	2	“	12		5	....
“	4	1	“	10		1	....
Clamp sleeves and appurtenances....	30	3	“	8		10	....
“	24	4	“	6		10	....
.....			Bell caps.	30		3	....
Gates.....	16	6	“	24		7	....
“	12	10	“	20		3	....
“	10	1	“	16		6	....
“	8	15	“	12		5	....
“	4	1	“	10		4	....
			“	8		20	....
			“	6		103	....
Reducers.....	30 to 24	1	Plug caps....	12		9	....
“	24 “ 12	1	“	8		15	....
“	20 “ 16	1	“	6		7	....
“	16 “ 12	1	“	4		6	....
“	12 “ 8	4					....
“	10 “ 8	1	Vertical gate box, (iron) ..			1	....
“	8 “ 6	5	Oblique “ “ “			3	....
“	6 “ 4	1	“ “ “ (wooden).			2	....
“	6 “ 5	7	Small gate box covers.....			42	..
			Cover without frame.....			1	..

- 65 street hydrants for 6-inch pipe.
- 4 " " for 12-inch pipe.
- 69 " " boxes.
- 74 " " box covers.

Miscellaneous :

- 1 box cover for street sprinkler.
- 8 collars for capping 8-inch pipe.
- 15 " " " 6-inch pipe.
- 4 pieces of collars, 12-inch.
- 19 small round covers for hydrant boxes.
- 3 blow-off bends, 8-inch.
- 1 36-inch spider and bolts.
- 35 feet of cast-iron rails.
- 1 hydrant neck.
- " bottom.
- 30 feet of 30-inch pipe, (pieces).
- 33 feet of 20-inch pipe, "
- 29 feet of 12-inch pipe, "
- 200 feet of 8-inch pipe, "
- 27 feet of 24-inch pipe, (pieces).
- 80 feet of 16-inch pipe, "
- 54 feet of 10-inch pipe, "
- 40 feet of 6-inch pipe, "
- 8,000 pounds of scrap-iron.
- 35 hydrant valves, nuts and rods.
- 3 fixtures for street sprinklers.
- 4,067 pounds pig lead.
- 6 patent sprinkler connections.
- 3 extra hydrant nuts.
- 9 air-cocks for main pipes.
- 17 air-cocks for gates.
- 5 2½-inch Chapman valves.
- 3 2½-inch Fales and Jenks valves.
- 12 pieces of wrought iron beams, 108 feet.
- 4 yokes for 12-inch pipe.
- 3 screws for 36-inch gates.
- 1 24-inch bonnet valve and screw.
- 1 10-inch " "
- 1 8-inch " "
- 9 6-inch " "
- 4 6-inch bonnet and screws.
- 2 6-inch bonnets.
- 2 4-inch relief valves.
- 1 bottom for Boston post hydrant.
- 5 3-inch ½ turns, brass.
- 4 2½-inch ½ turns.
- 5 8-inch iron flanges.

5 6-inch iron flanges,
22 2½-inch valves, (old stock).
8 extra stuffing-boxes for water-gates.
1 set of fixtures for capping 30-inch pipe.
1 reducer for hydrant-head.
5 small screw piles.
22,000 Danversport brick at Hill's wharf.
30 ½-inch brass plugs.
¼ barrel black lead.
1 keg blasting powder.
75 feet fuse.
200 pounds jute packing.
1 chaldron coke.
¾ barrel lamp-black.
1,300 3-inch drain tile.
2,496 4-inch " "

Schedule of material received and delivered during 1877,
also balance on hand January 1st, 1878:

Received during 1877 to- gether with quantity on hand Jan. 1, 1877.			Delivered.	Bal. on hand Jan. 1, 1878.	Received during 1877 to- gether with quantity on hand Jan. 1, 1877.			Delivered.	Bal. on hand Jan. 1, 1878.
Kind.	Size.	Pieces	Pieces	Pieces	Kind.	Size.	Pieces	Pieces	Pieces
Pipe.	36	9	0	9	Branch pipe	16x16	36	1	35
"	30	7	0	7	"	12x12	5	0	5
"	24	28	0	28	"	12x10	1	0	1
"	20	12	0	12	"	12x8	26	9	17
"	16	178	97	81	"	12x6	27	11	16
"	12	1344	305	1039	"	12x8x8	1	0	1
"	10	24	0	24	"	12x8x6	1	0	1
"	8	1484	697	787	"	12x6x6	4	0	4
"	6	3855	3480	375	"	10x8	5	0	5
"	4	110	66	44	"	10x6	4	0	4
Branch pipe	30x30	1	0	1	"	10x8x6	1	0	1
"	30x24	1	0	1	"	10x6x6	2	0	2
"	30x20	1	0	1	"	10x8x8	1	0	1
"	30x16	1	0	1	"	8x8	39	20	19
"	30x12	1	0	1	"	8x6	33	21	12
"	30x10	1	0	1	"	8x8x8	4	1	3
"	30x8	1	0	1	"	8x8x6	1	0	1
"	30x6	2	0	2	"	8x6x6	8	7	1
"	30x24x12	1	0	1	"	8x4	3	1	2
"	30x12x8	1	0	1	"	6x8	94	53	41
"	30x8x8	1	0	1	"	6x6	106	48	58
"	30x8x6	1	0	1	"	6x8x6	4	0	4
"	24x24	1	0	1	"	6x6x6	23	13	10
"	24x16	1	0	1	"	6x4	12	12	0
"	24x12	1	0	1	" Ys.	6x6	5	1	4
"	24x10	1	0	1	"	4x4	6	1	5
"	24x8	1	0	1	Blow off.	30	1	0	1
"	24x6	1	0	1	"	24	1	0	1
"	24x8x8	1	0	1	Manholes. .	36	1	0	1
"	24x8x6	1	0	1	"	30	1	0	1
"	20x16	1	0	1	"	24	1	0	1
"	20x12	1	0	1	Gate boxes.	118	114	4	
"	20x10	1	0	1	Curved pipe	30	7	0	7
"	20x8	1	0	1	"	24	12	0	12
"	20x6	1	0	1	"	20	6	0	6
"	20x10x8	1	0	1	"	16	4	0	4
"	20x8x6	1	0	1	Quar. turns.	8	10	0	10
"	20x6x6	1	0	1	"	6	6	3	3
"	16x16	1	0	1	"	4	1	1	0
"	16x12	1	0	1	Eig'h turns.	12	3	0	3
"	16x10	2	0	2	"	10	4	0	4
"	16x8x8	1	0	1	"	8	9	4	5
"	16x8x6	1	0	1	"	6	12	11	1
"	16x12x12	1	0	1	16th turns.	10	3	0	3
"	16x8x6	2	0	2	"	8	7	0	7
"	16x8	23	3	20	"	6	21	18	3

<i>Received during 1877, together with quantity on hand Jan. 1, 1877.</i>					<i>Received during 1877, together with quantity on hand Jan. 1, 1877.</i>				
Kind.	Size in inches.	Pieces	Pieces	Delivered.	Kind.	Size in inches.	Pieces	Pieces	Delivered.
				<i>Bal. on hand Jan. 1, 1878.</i>					<i>Bal. on hand Jan. 1, 1878.</i>
Sleeves....	36	1	0	1	Reducers...	10 to 8	1	0	1
"	30	32	0	32	"	8 to 6	8	3	5
"	24	16	0	16	"	6 to 4	6	5	1
"	20	3	0	3	"	6 to 5	7	0	7
"	16	1	0	1	Hydrants...		137	68	69
"	12	18	0	18	Caps.....	4	12	6	6
"	10	3	0	3	"	6	283	173	110
"	8	28	11	17	"	8	143	75	68
"	6	28	26	2	"	10	7	2	5
"	4	2	1	1	"	12	22	3	19
Gates.....	4	13	12	1	"	18	9	1	8
"	6	95	95	0	"	20	3	0	3
"	8	26	11	15	"	24	7	0	7
"	10	1	0	1	"	30	3	0	3
"	12	14	4	10	Bevel hubs.	12	17	6	11
"	16	6	0	6	"	10	3	0	3
Reducers...	30 to 24	1	0	1	"	8	17	2	15
"	24 to 12	1	0	1	"	6	49	31	18
"	20 to 16	1	0	1	Hyd't boxes	....	138	69	69
"	16 to 12	2	1	1	Gate box frames and covers....	....	150	108	42
"	12 to 8	7	3	4					

INVENTORY OF MATERIAL FOR DRINKING FOUNTAINS ON HAND.

6 galvanized cups and chains.
 3 new cups from Gorham Mfg. Co.
 33 feet of cup chains, with extra rings, etc.
 2 Zane's self-closing faucets.
 4 new tops for above.
 2 new flanges for above.
 10 signs, "Please Keep Cup out of Bowls."
 12 screws for above signs.

MATERIAL FOR DRINKING TROUGHS.

1 set of patterns. for drinking trough inlets.
 6 brass castings " " " "
 4 brass casting nuts.
 9 cast-iron stands, for small drinking troughs.
 2 stone troughs.

FOR LARGE TROUGHS.

9 boiler bottoms.
 3 bowls for same.

SERVICE BOXES.

3 large boxes.

250 small boxes.

26 extra plugs.

MISCELLANEOUS.

31 pounds brass tubing.

1 iron mould for making rubber packings for tapping machines.

13 hydrant heads with two outlets, used in freezing season.

50 baskets charcoal.

1 panel pattern for pumps.

4 pounds tarred marlin.

51 feet $\frac{3}{4}$ -inch tarred iron pipe.

Size.	Taps.	Stops.	Plugs.	Tin-P'd L'd Pipe	Com. Lead Pipe.
In.	Number.	Number.	Number.	Pounds.	Pounds.
$\frac{3}{8}$	2012	2071	31	...	....
$\frac{1}{2}$	256	167	35	931	3726
$\frac{3}{4}$	143	157	9	280	2787
$\frac{1}{2}$	47	43	13	605	3591
1	8	19	18	63	1928
$1\frac{1}{2}$	.....	.....	..	296	993
$1\frac{3}{4}$	.....	.....	..	...	89

Solder, 339 pounds; lead, 853 pounds; tin, 405 pounds; 18 pounds metallic paint; 3 paint brushes; 1 paint duster; 1 1-gallon oil-can; $1\frac{1}{2}$ -gallon oil can; 2 paint cans.

Following is an estimate of the additional amount of material required for the extension of water pipes for the year ending December 31, 1878, based upon amount used during 1877:

KIND.	SIZE.	Number of Pieces.	WEIGHT.		
	Inches.		Pounds.	Tons.	Total Tons.
Pipe.....	6	3148	.....	564.59	.....
".....	16	440	.....	301.12	.....
".....	20	25	.....	23.91	.....
".....	24	42	.....	58.44	943.06
Branches.....	8 x 6	10	2300	.....	.....
".....	8 x 6 x 6	5	1430	.....	.....
".....	6 x 8	15	3180	.....	.....
".....	6 x 4	10	1720	.....	.....
".....	6 x 6 x 6	5	1200	.....	.....
Turns, Eighth.....	6	15	1350	.....	.....
".....	8	5	1185	.....	.....
" Sixteenth.....	6	20	1740	.....	.....
Sleeves.....	6	25	1400	.....	.....
Reducers.....	6 to 4	5	350	.....	7.08
Gate boxes and covers...	6	95	90,000	.....	40.18
Gates.....	6	95	.....	.....	.....

The following material will be required for Service Pipe Work :—

About thirty tons of lead pipe, largely $\frac{5}{8}$ -inch and $\frac{3}{4}$ -inch.

Six hundred and fifty small service boxes.

Four hundred and fifty pairs of $\frac{1}{2}$ -inch taps and stops.

Six large bowls for drinking troughs of the boiler pattern, and eight lamp-posts to go with the same.

Fifteen 1-inch taps and stops.

METER DEPARTMENT.

The following table shows the work done in this department during the year :

MAKE.	METERS SET IN NEW PLACES.					TAKEN OUT TO BE REPLACED OR FOR DISCONTINUANCE OF USE.					SET TO REPLACE THOSE TAKEN OUT.					METERS SET ON TRIAL.				
	Size in inches.					Size in inches.					Size in inches.					Size in inches.				
	%	1	1½	2	Totals.	%	1	1½	2	Totals.	%	1	1½	2	Totals.	%	1	1½	2	Totals.
Ball & Fitts, Piston.....	320	88	19	3	424	11	2	1	1	17	11	1	2	1	15					
Ball & Fitts, Rotary.....			1	2	4									1	1					2
Falca, Jenks & Sons.....		1	1	2	4	122	1			123	132	1			1					
Worthington.....						1				1						1				1
Gann.....																1				1
Totals.....	320	88	20	4	3,428	13	134	3	1	153	146	2	2	1	1	150	3	1		4

*Taken out for discontinuance of use.

The above work is in charge of Edward A. Moran.

TABLE SHOWING THE RAINFALL AT HOPE RESERVOIR FOR THE YEAR 1877.

Day of Month	January.		February.		March.		April.		May.		June.		July.		August.		September.		October.		November.		December.	
	Fall.		Fall.		Fall.		Fall.		Fall.		Fall.		Fall.		Fall.		Fall.		Fall.		Fall.		Fall.	
1	Comm'd.	1.60	...	...	Comm'd.	2.01	...	.60	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
2	Comm'd.	...	...	...	...	.01	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
3
4
5
6	...	1.80	...	...	...	...	...	...	...	...	Comm'd.	8.80	...	...	...	...	...	...	...	...	...	...	...	1.40
7
8	1.02	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
9
10
1105	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
12
13
14	...	1.00	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
15
16
17
18
19
20
2110	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
22
23
24
25
26
27
28
29
30
31
Tot	...	4.55	...	...	...	7.99	...	2.40	...	4.40	...	4.60	...	3.60	...	8.41	...	.90	...	5.81	...	6.41	...	1.40

Total fall for the year, 48.80 inches.

TABLE SHOWING THE RAINFALL AT SOCKANOSSET RESERVOIR FOR THE YEAR 1877.

Month	January.		Feb.		March.		April.		May.		June.		July.		August.		September.		October.		November.		December.	
	Fall.	Fall.	Fall.	Fall.	Fall.	Fall.	Fall.	Fall.	Fall.	Fall.	Fall.	Fall.	Fall.	Fall.	Fall.	Fall.	Fall.	Fall.	Fall.	Fall.	Fall.	Fall.	Fall.	
1	..	.50	.45	Comm'd Ceased.	.47	Comm'd.	.80	..	..	.19	.02	.28	..	..	..	..	..	..	..	..	..	..	..
2	
3	
4	
5	
6	..	1.73	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
7	
8	
9	
10	
11	
12	
13	
14	
15	Comm'd.	3.09	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	
26	
27	
28	
29	
30	
31	
Tot.	5.56	1.06	10.02	2.37	4.01	5.92	3.99	4.08	8.71	8.00	..	..	..	..	..	..	..	..	..	..	..	..	..

Total rainfall for the year, 55.68 inches.

TABLE SHOWING THE RAINFALL AT PETTACONSETT PUMPING STATION FOR THE YEAR 1877.

Day of Month	January.		February		March.		April.		May.		June.		July.		August.		September		October.		November.		December.	
	Fall.	Comc.	Fall.	Comc.	Fall.	Comc.	Fall.	Comc.	Fall.	Comc.	Fall.	Comc.	Fall.	Comc.	Fall.	Comc.	Fall.	Comc.	Fall.	Comc.	Fall.	Comc.	Fall.	Comc.
1	Comc.																							
2	Comc.		.08		.02		.17																	
3	Comc.		.47		.02				.02				.22											
4	Comc.								.006				.02											
5	Comc.																							
6	Comc.												1.20											
7	Comc.																							
8	Comc.																							
9	Comc.																							
10	Comc.												.06											
11	Comc.																							
12	Comc.																							
13	Comc.																							
14	Comc.																							
15	Comc.																							
16	Comc.																							
17	Comc.																							
18	Comc.																							
19	Comc.																							
20	Comc.																							
21	Comc.																							
22	Comc.																							
23	Comc.																							
24	Comc.																							
25	Comc.																							
26	Comc.																							
27	Comc.																							
28	Comc.																							
29	Comc.																							
30	Comc.																							
31	Comc.																							
Tot	6.08		1.30		10.38		1.24		2.855		6.075		4.852		1.95		.73		8.295		8.54		1.25	

Total fall for the year, 53.547 inches.

The following table shows the average maximum and minimum elevations of the Pawtuxet River at Pettaconset for the year 1877 :

MONTH.	AVERAGE ELEVATIONS.				MAXIMUM.			MINIMUM.		
	Monthly.			Daily.						
	7 A.M.	12 M.	5 P.M.		Date.	Hour.	Eleva.	Date.	Hour.	Elevations.
January...	9.17	10.01	9.86	9.68	8	12 M.	12.05	3	7 A.M.	8.25
February...	8.90	9.23	9.29	9.17	10	6 P. M.	9.95	19	"	8.32
March.....	11.60	11.87	11.72	11.73	27	10 to 12 P.M.	18.00	1	"	8.78
April.....	9.51	9.98	9.74	9.74	2	12 M.	12.20	15	6 P.M.	8.00
May.....	8.93	9.47	9.32	9.24	25	"	11.00	31	7 A.M.	8.00
June.....	8.92	9.45	9.23	9.20	8	"	11.90	6	6 P.M.	8.00
July.....	8.29	8.85	8.78	8.64	2 & 7	"	9.15	29 & 30	7 A.M.	8.10
August.....	8.30	8.88	8.83	8.67	31	"	9.20	12	"	8.05
September...	8.23	8.73	8.72	8.56	1	"	9.06	24	"	7.98
October....	8.60	9.19	9.09	8.96	5	8 P. M.	10.58	3	"	7.88
November...	10.09	10.47	10.40	10.32	27	6 "	15.20	1	"	8.46
December...	9.61	10.06	9.82	9.83	6 & 8	12 M.	13.20	31	"	8.56
For the y'r.	9.18	9.69	9.57	9.48	Mar. 27	10 to 12 P. M.	18.00	Oct. 3	7 A.M.	7.88

The average daily consumption of water, including waste and leakage, during each month of the year 1877, was for :

January.....	2,269,852	gallons.
February.....	2,258,338	"
March.....	1,836,037	"
April.....	2,250,747	"
May.....	2,526,668	"
June.....	2,886,860	"
July.....	2,914,214	"
August.....	2,762,598	"
September.....	3,012,462	"
October.....	2,607,809	"
November.....	2,217,243	"
December.....	2,216,415	"

During the year the Cornish engine has run about one hundred and four and one-half days ; the Worthington engine has run about sixty-five and one-half days ; the Corliss engine has run about one hundred and ninety-six and one-half days, and the Nagle engine has run about one hundred sixty-eight and one-half days.

The Worthington engine has received some repairs and is

now in good condition. The Cornish engine was disabled July 25th, was repaired and started September 4th. December 12th it was again stopped to make repairs on joint between steam-jacket and cylinder, beside raising stand-pipe, and raising and leveling the pump. It is expected it will soon be in condition to run.

The Corliss and Nagle engines at Hope station have, since July last, been run alternate months as near as practicable.

December 5th, soon after starting the Nagle engine, the branch pipe, known as the "four way piece," which connects the pump with the main, burst, causing some damage and disabling the engine; repairs are being made, and it is expected it will soon be in condition to run.

October 3d and 9th, experiments were made relative to the pressure of Hope and Sockanosset reservoirs, since which time that portion of the city known as the low service has been supplied from Sockanosset reservoir, Hope reservoir being used to supply the engines at Hope engine house for the high service.

The reservoirs are in their usual condition.

The drive-ways to coal vaults, together with top of vaults at Hope station have been concreted. Hand rails have been put up on embankment steps at Hope and Sockanosset reservoirs.

The various buildings and bridges belonging to the Water Works have received such repairs as have been considered necessary to keep and maintain them in good and proper order and condition.

The cost of engineering for the work connected with the Water Works during the year, from March 10th to December 31st, has been \$2,300.00, exclusive of time of city engineer. The force has consisted of Edmund B. Weston, engineer in charge of water department, William M. Brown, Jr., principal, and Archibald W. Troop and Fred. I. Williams, assistants. The profiles, from which to estimate the cost of laying water pipe, have been made by the grade department, and lines of un-curbed streets given by the street line department.

SEWERS.

The following is a list of sewers built in 1877 :

STREET.	ORDERED.		DATE OF COMPLETION.	SIZE IN.	MATERIAL.	LENGTH BUILT.	
	No.	Date.				Feet.	Miles.
Blackstone st. near Eddy st. to Allen's av.	262	April 27, 1876.	Feb. 28, 1877..	66x72	4 in. brick & concrete.	530.64	.100
Gano st., Bower st. to Front st.	349	June 11, 1877..	Not complete.	30x45	4 in. brick, arch.	647.78	.123
Manton ave. near Malden st. to River	608	Oct. 15, 1877..	Nov. 19, 1877.	48	8 in. brick.	100.00	.019
" " " " " "	609	" " " "	" " " "	40	8 in. brick.	568.25	.108
" " " " " "	609	" " " "	" " " "	36	8 in. brick.	195.80	.087
" " " " " "	608	" " " "	" " " "	30	4 in. brick, arch.	949.17	.086
India st. and Gano st.	608	" " " "	" " " "	24	4 in. brick.	284.74	.054
Front st., East st. to Ives st.	349	June 11, 1877..	Not complete.	22	4 in. brick.	767.60	....
Thayer st., Barnes st. 200 feet northerly.	495	Sept. 6, 1877..	Not complete.	22	4 in. brick.	686.25	....
Federal st., Dean st. to Bradford st.	240	April 26, 1877..	May 29, 1877..	18	" " " "	219.45	.315
" " " " " "	240	" " " "	" " " "	15	pipe.	361.90	.069
Nash Lane, near Nash Lane bridge.		" " " "	" " " "	15	" " " "	3.00	....
Vernon and Battery st., Fallas to Carpenter st.	407	July 12, 1877..	Sept. 5, 1877..	15	" " " "	84.00	....
Pike st., Traverse st. to Brook st.	495	Sept. 6, 1877..	Not complete.	15	" " " "	214.55	....
Union st., Westminster to Happy st.	708	Dec. 14, 1876..	April 7, 1877..	12	" " " "	287.35	.102
Union st., Washington, 160 feet southerly		March 29, 1877.	April 11, 1877..	12	" " " "	190.20	....
Union st., extension from Washington st. 40 feet southerly	1198	April 14, 1877..	May 24, 1877..	12	" " " "	154.48	....
						53.20	....

Ringgold st., Carpenter st. to Broadway.	174	March 19, 1877.	April 14, 1877.	12	pipe.	310.90	....
West Clifford st., Point st. to Pearl st....	176	"	April 26, 1877.	12	"	687.24	....
Waterman st., Thayer st., to Brook st....	654	Nov. 11, 1876.	May 3, 1877...	12	"	247.10	....
Waterman st., east line H. N. Campbell estate to Brook st....	653	"	May 18, 1877.	12	"	773.90	....
Federal st., Dean st., to Bradford st....	240	April 26, 1877.	May 26, 1877...	12	"	58.20	....
John st., Neighbor's lane to Benefit st....	309	May 24, 1877.	June 1, 1877.	12	"	405.10	....
Arch st., Gilmore st. to present sewer...	300	"	June 12, 1877.	12	"	554.91	....
Gilmore st., summit to Arch st....	339	June 4, 1877.	June 12, 1877.	12	"	263.63	....
Brook street District, east of Ives st....	849	June 11, 1877.	Not complete.	12	"	2,732.39	....
Brook street District west of Ives st....	495	Sept. 6, 1877...	"	12	"	3,641.45	....
Vernon and Battey sts., Carpenter to Pallas st....	407	July 12, 1877.	Sept. 5, 1877.	12	"	464.07	....
Friendship st., Beacon st., southerly...	438	July 30, 1877.	Sept. 1, 1877.	12	"	176.37	....
Carpenter st., Marshall to Courtland st....	508	Sept. 6, 1877.	Sept. 19, 1877.	12	"	880.22	....
Hammond st., Gilbert to High st....	517	Sept. 17, 1877.	Oct. 6, 1877...	12	"	237.60	....
Lloyd st., 100 feet east of Hope st. to Thayer st....	307	Oct. 15, 1877.	Nov. 26, 1877.	12	"	468.30	2.254
Total.....						17,142.74	3.247

Eighty-six catch basins have been built and connected with the sewers constructed this year.

The following have been built to relieve the streets of surface water :—

- 1 at the corner of Cove street and Eddy street.
- 2 at the corners of Broad street and Public street.
- 2 near the junction of Manton ave. and Atwells avenue.
- 2 on Nash Lane at the corners of Nichols street and Allen street.
- 2 on Peck street near Friendship street.
- 1 at the corner of Exchange Place and Arcade street.
- 2 on Pine street, between Hay street and Dyer street.
- 1 on Custom House street near Dyer street.
- 1 and a half on corner of Thurber's ave. and Prairie avenue.

There have been built to trap old stone drains :—

- 2 on corners of Steeple street and Canal street.
- 2 on Halsey street at Benefit street.
- 2 on Benefit street at Jenckes street.
- 1 on Benefit street at Church street.
- 4 on the corners of Benefit street and South Court street.
- 2 on Gaspee street near the State Prison.
- 4 at the corner of Doyle ave. and Camp street.
- 8 on Doyle avenue, between Camp street and North Main street.
- 3 on North Main street near Doyle avenue.

There have been 383 private connections with sewers made during the past year.

MAINTENANCE.

The following shows the work during the year, cleaning and repairing sewers and basins :

		Number cleaned.	Length cleaned.		Deposit r'mov'd cu. yds.	Tot. dep r'moved cu. yds.	Number filled fm hydr'ts.
			Miles.				
New Sewers..	Catch basins..	5799	....	3899	....	4494	
	Sewers.....	39	6.41	154	4053	....
Old Sewers...	Sand catchers	61	....	640	....	....
	Drains.....	5	.08	27	....	....
	Basins.....	67	....	120	787	....
					4840		

The pointing of the Martin street sewer, omitted in the

construction in 1876 for a distance of 400 feet, has been completed.

21 catch basins have been built to conform to change in curb lines, 27 holes around basins caused by settlement of back filling, repaired, gravel placed around 78 basins where sidewalks were badly worn, and 9 broken covers replaced. 63 holes in street over sewers, caused by settlement of trenches, have been filled. 175 man-holes and 11 lantern holes have been lowered or raised to the surface of the street, as the changes in grade or necessity required, 6 man-holes repointed, and 3 broken covers replaced.

65 house connections have been cleaned, and 18 cisterns filled from fire hydrants.

The above work is in charge of Allen Aldrich.

Inventory of stock belonging to City of Providence, Sewer Department, on hand January 1st, 1878:

AT PIPE YARD.

	MAKE.	SIZE—in Inches.	PIECES.	
Pipe, Straight.....	Scotch.	18	102	....
“ Branch.....	“	18 x 12	6	....
“ “.....	“	18 x 6	44	....
“ Straight.....	“	15	11	....
“ Branch.....	“	15 x 6	36	....
“ “.....	“	15 x 12	3	....
“ Straight.....	Akron.	15	5	....
“ Branch.....	“	15 x 12	9	....
“ “.....	“	15 x 6	139	....
“ Straight.....	Scotch.	12	1,096	....
“ Y Branch...	“	12 x 12	9	....
“ Branch.....	“	12 x 12	19	....
“ “.....	“	12 x 6	470	....
“ Y Branch...	G. W. Rader	12 x 12	18	....
“ Branch.....	“	12 x 6	166	....
“ Straight....	Akron.	12	196	....
“ Branch.....	“	12 x 12	53	....
“ “.....	Bowman.	12 x 6	21	....
Bevel Connections..	Akron.	12	26	....
“ “.....	“	6 for 8 in. work.	407	....
“ “.....	Rader.	6 for 8 in. work.	207	....
“ “.....	“	6 for 4 in. work.	156	....
Curves.....	Akron.	12	24	....
“ “.....	Rader.	6	7	....
Inverts.....	“	for 8 in. work.	766	....
“ “.....	“	for 4 in. work.	620	....
Branch Manhole Inverts.....	Akron.	....	9	....
Straight Manhole Inverts.....	Rader.	....	188	....
Curved Manhole Inverts.....	“	....	16	....
Curved lamphole inverts.....	Akron.	....	408	....
Pipe, Y branches...	....	6 x 6	120	....
Pipe, Straight.....	....	6	251	2 foot l'gths.
“ “.....	....	6	73	“ “
“ “.....	....	6	350	“ “
Manhole frames and covers.....	....	....	209	....
Lamphole frames & covers.....	....	....	70	....
Catch basin traps...	....	....	106	....
Catch basin covers...	....	....	62	....
Sewer inlets.....	....	12	9	....
Large grated covers	....	....	8	....

	Make.	Pieces.		Make.	Pieces.
Small grated covers		4	At City Yard	Cove	Lands.
Manhole rods.....		37	corner coping stones		73
Brick.....	B.J.A. & Co.	287.400.	" gutter "	.....	81
.....	.....	.....	Straight coping "	.....	130
.....	.....	.....	Right gutter "	.....	71
.....	.....	.....	Left gutter "	.....	71
.....	.....	.....	Plain gutter "	.....	4

SCHEDULE OF SEWER MATERIAL RECEIVED AND DELIVERED DURING THE YEAR AND BALANCE ON HAND
DECEMBER, 31st, 1877.

Received during 1877 together with quantity on hand January 1, 1877.			Received during 1877 together with quantity on hand Jan'y 1, 1877.			Bal. on hand Dec. 31, 1877.		
Kind.	Size in In.	Pieces.	Kind.	Size in In.	Pieces.	Quantity Delivered.	Pieces.	Pieces.
Pipe.....	18	102	Man-hole inverts.....	.....	206	0	102	9
" Branch.....	18x12	6	" " curved.....	.....	16	0	6	16
" ".....	18x6	44	Curved lamp-hole inverts.....	.....	414	0	44	408
" ".....	15	192	Branches.....	6x6	122	176	16	2
" ".....	15x6	201	Pipe 1 foot length.....	6	352	26	176	120
" ".....	15x12	15	" 2 feet.....	6	469	8	12	350
" ".....	12	4,644	" 3 ".....	6	280	8,352	1,292	251
" Y ".....	12x12	27	Man-hole frames and covers.....	.....	378	0	27	7
" ".....	12x12	131	Lamp-hole " ".....	.....	81	59	72	209
" ".....	12x6	1,049	Catch-basin traps.....	.....	239	1,062	557	70
Bavel connections.....	12	48	" covers.....	.....	209	22	26	108
" ".....	6	1,066	Sewer inlets.....	12	10	296	770	62
Pipe (curved).....	12	71	" ".....	Large.	10	47	24	9
" ".....	6	23	Grated covers.....	Small.	4	16	7	8
Invert blocks.....	8	1,474	Man-hole rods.....	.....	37	708	766	4
" ".....	4	1,083	Brick.....	.....	1,001,710	413	620	37
					287,400			

The following is an estimate of material which will probably be required for sewer construction for the season of 1878, based upon quantity used in 1877.

REQUIRED.			REQUIRED.		
Kind.	Size inch	Pieces	Kind	Size inch	Pieces
Pipe straight.....	15	264	Invert blocks....	8	1062
“ “	12	5028	“ “	4	770
“ “2ft. lengths	6	327	Lamphole frame & covers.....		269
“ “3 “ “	6	379	Manhole “ “		18
“ curved.....	12	100	Catch basin stones (corners).....		30
“ “	6	24	Catch basin stones straight.....		160
“ branches.....	15x12	5	“ basin traps..		200
“ “	15x6	39	“ “ covers..		220
“ “	12x12	74	Grated covers.....	Large	3
“ “	12x6	1638	“ “	Small	8
Bevel connections...	12	33	Brick.....		1,071.465
“ “ short	6	444			

Besides making sewer calculations, plans laying out and superintending construction of the sewers built, together with all work on private drains, much work has been done on surveys, calculations and plans for sewers in First, Ninth and Tenth wards.

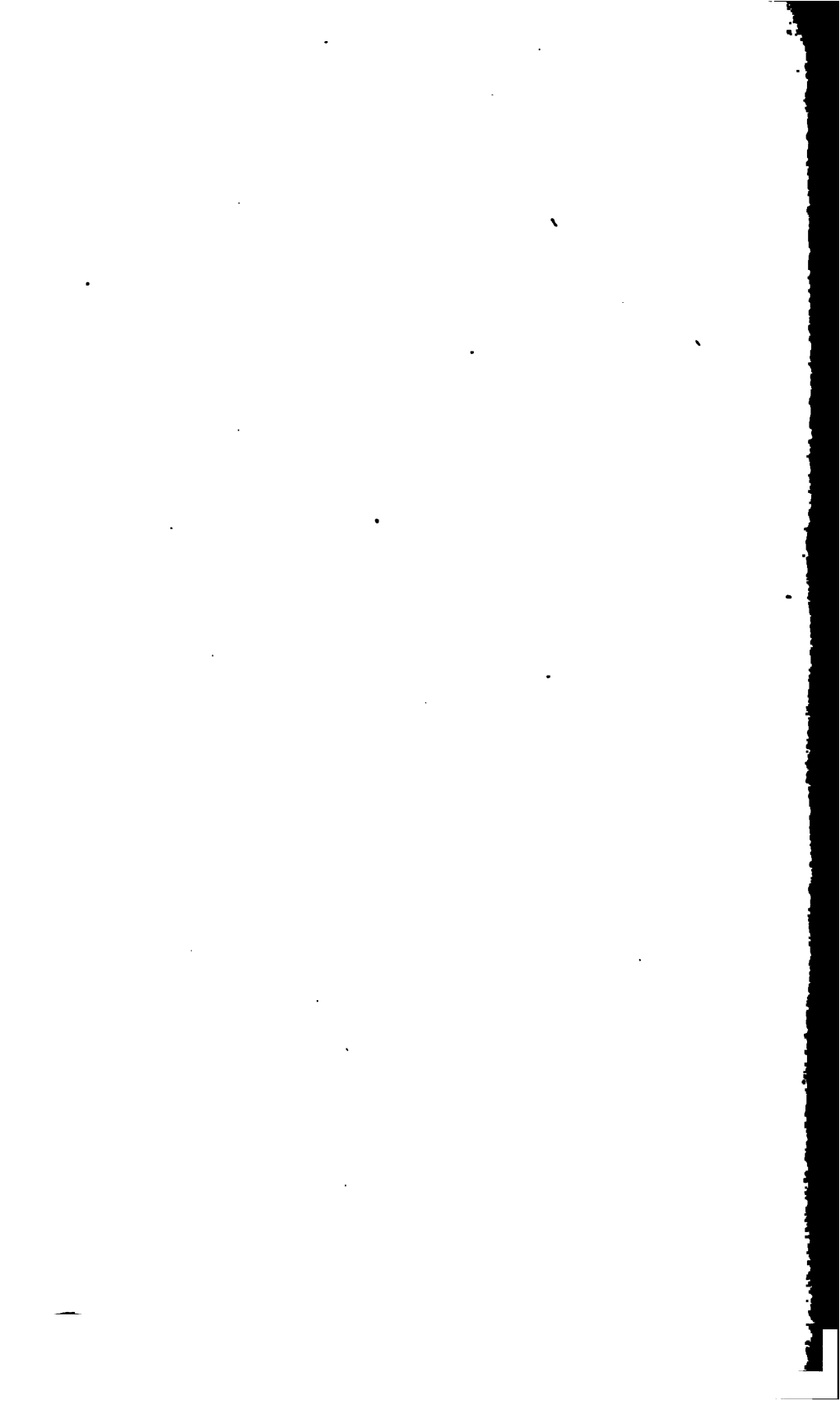
The cost of engineering, for the sewer department, from March 10th, to December 31st, 1877, has been about \$5,100.00. The force has consisted of Otis F. Clapp, Engineer in charge, Sewer Department, Edwin P. Dawley and Leprelete Sweet, 2nd, principals, and George Alexander and Frederick R. Arnold, assistants.

A new building for the accommodation of Sewer Maintenance Department, has been built on land owned by the City, on the Cove lands east side of the Park street bridge.

Respectfully,

SAMUEL M. GRAY,

City Engineer, and Supt. of Water Works and Sewers.



1879.]

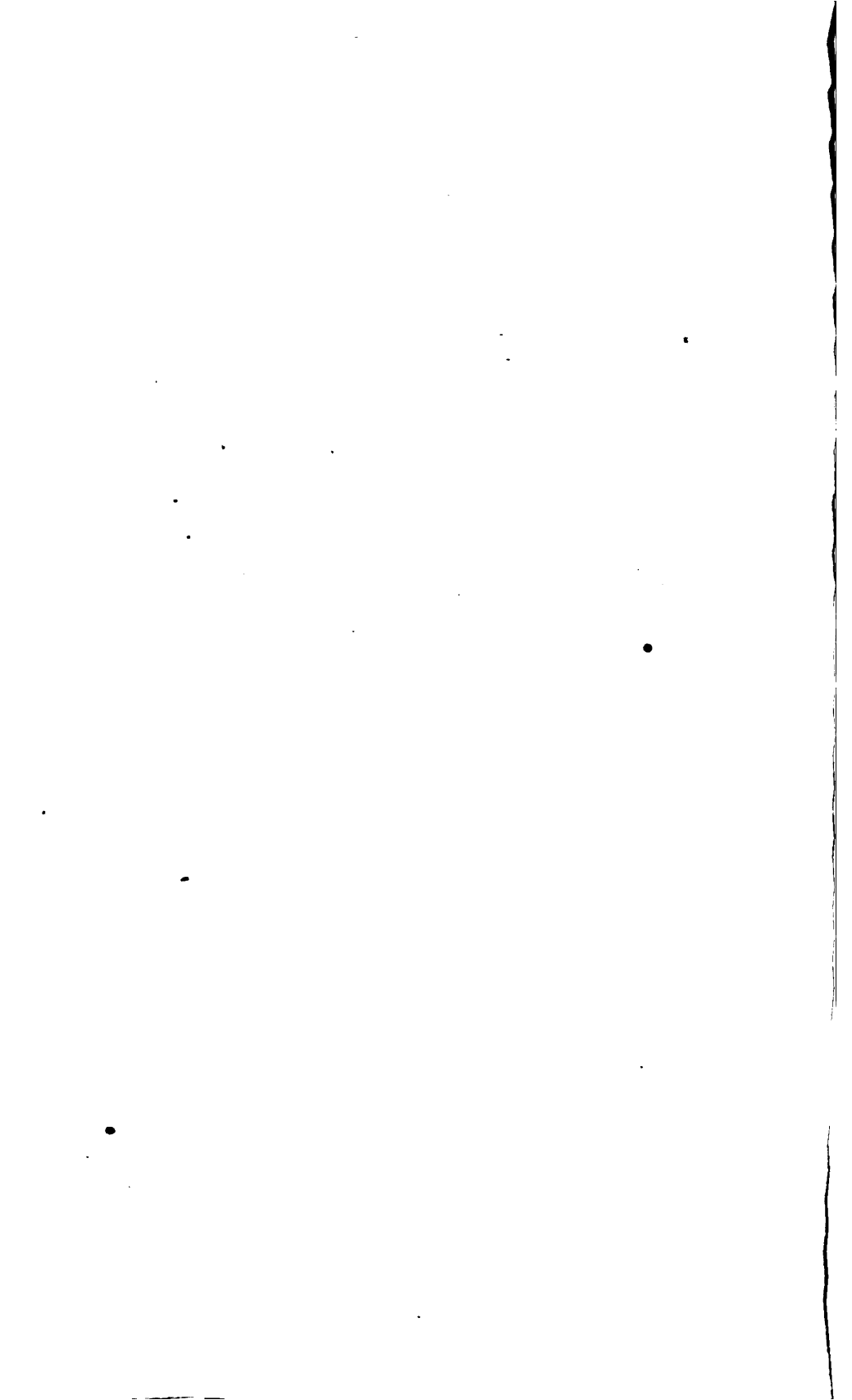
CITY DOCUMENT.

[No. 9.]

THIRD ANNUAL REPORT
OF THE BOARD OF
WATER COMMISSIONERS,
OF THE
CITY OF PROVIDENCE,
• MARCH 3, 1879,
AND
REPORT OF THE ENGINEER AND SUPERINTENDENT.



PROVIDENCE:
PROVIDENCE PRESS COMPANY, PRINTERS TO THE CITY.
1879.



1879.]

CITY DOCUMENT.

[No. 9.]

THIRD ANNUAL REPORT
OF THE BOARD OF
WATER COMMISSIONERS,
OF THE

With compliments of the

BOARD OF WATER COMMISSIONERS,

CLINTON D. SELLEW,

Secretary.

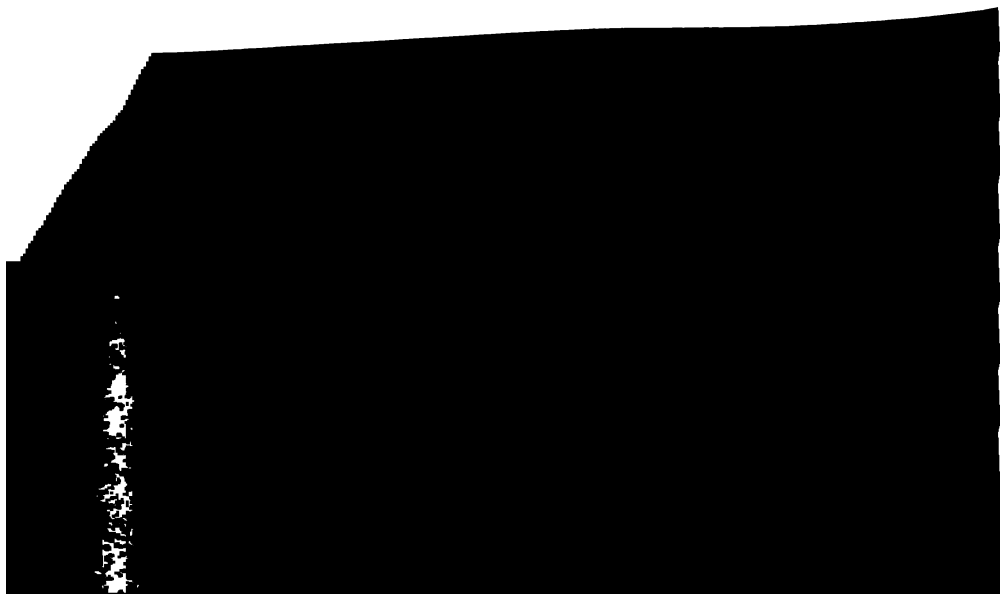
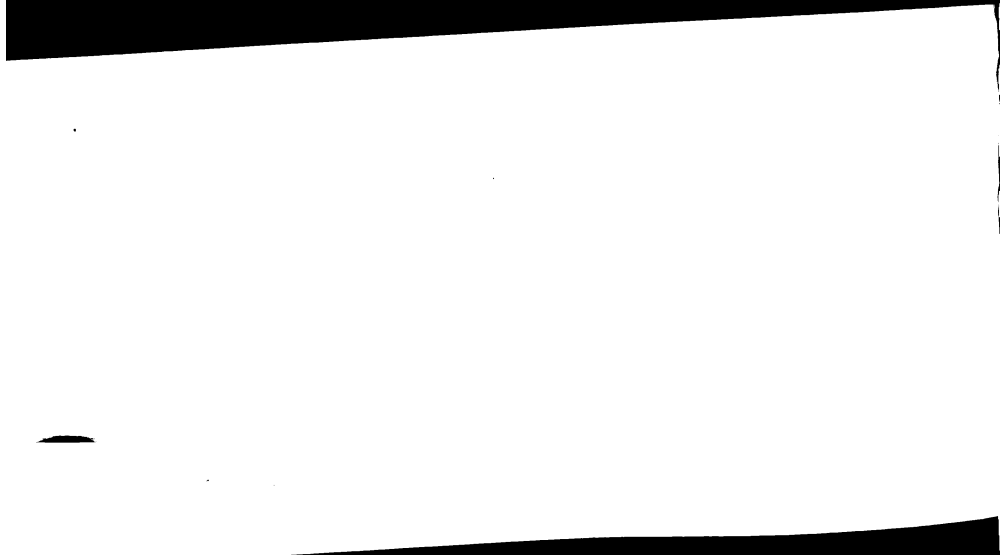
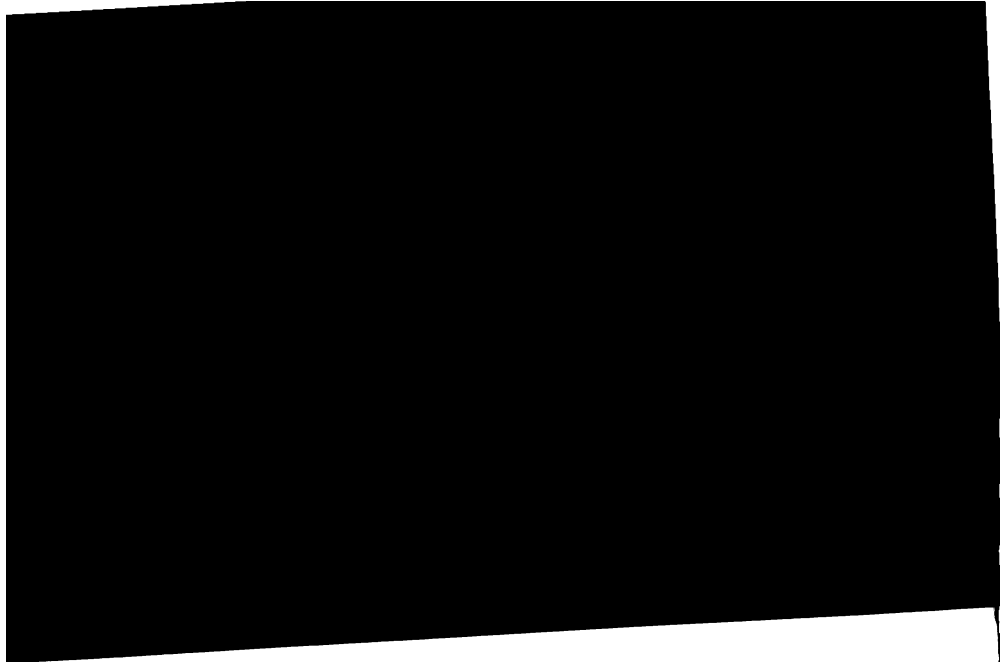
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1879.



ORGANIZATION
OF THE
PROVIDENCE WATER WORKS.

BOARD OF WATER COMMISSIONERS.

LODOWICK BRAYTON, PRESIDENT,
HENRY L. PARSONS,
NATHANIEL F. POTTER.

SECRETARY OF THE BOARD OF WATER COMMISSIONERS.

CLINTON D. SELLEW,
Office, City Hall.

CITY ENGINEER AND SUPERINTENDENT.

SAMUEL M. GRAY,
Office, City Hall.



REPORT.

BOARD OF WATER COMMISSIONERS' OFFICE, }
Providence, R. I., March 3, 1879. }

TO THE HONORABLE THE CITY COUNCIL:

The Board of Water Commissioners, elected under an Ordinance of the City Council, passed October 19th, 1876, respectfully present their third annual report:—

Horatio L. Briggs has been appointed Superintendent at Pettaconset and Sockanosset, at a salary of \$1,000 per year, to fill a vacancy caused by the death of William T. Schneider. Mr. Briggs entered upon his duties November 1st, 1878.

July 22d, 1878, the offer of Hopkins, Pomroy & Co., to furnish fourteen hundred (1400) tons of egg coal, delivered as required at Pettaconset Pumping Station, for the sum of four $\frac{50}{100}$ (4.50) dollars per ton, and three hundred (300) tons of stove coal, delivered as required at Hope Pumping Station, for the sum of four $\frac{75}{100}$ (4.75) dollars per ton, the delivery in each case to be completed on or before July 1, 1879, was accepted.

The southerly portion of the lot of land owned by the city and located in the village of Pawtuxet, town of Warwick, has been leased to Charles H. Arnold from June 1, 1878, for the sum of seventy-five dollars per annum, payable quarterly

in advance. The lease may be terminated on three months' notice being given by either party thereto.

The "Randall estate," so called, at Pawtuxet has been leased for two years from January 1, 1878, to Peleg P. Cranston, for the sum of two hundred (200) dollars per annum, payable quarterly.

There being no barn on the Rhodes farm, one about 45x32 has been built at a cost of \$379.29.

Under the authority given them by resolution of the City Council, approved March 7th, 1878, the Commissioners, on the 26th day of said month, accepted the proposal of the Warren Foundry and Machine Company, of Phillipsburg, N. J., to furnish eight hundred (800) tons of cast iron water pipe as follows :

475 tons 6 inch at \$26.33 per ton of 2,240 pounds.

250 tons 16 inch at 25.63 per ton of 2,240 pounds.

25 tons 20 inch at 25.61 per ton of 2,240 pounds.

50 tons 24 inch at 25.69 per ton of 2,240 pounds.

A contract was subsequently signed and has been completed.

Under the authority given by resolution of the City Council, approved July 10th, 1878, the interest the city had in a lot of land situated on the easterly side of the Main street in Pawtuxet, town of Cranston, has been sold to Joseph B. Hayward for the sum of three hundred (300) dollars, the city reserving all water rights it had in said estate.

On the 14th day of November last, by direction of the Mayor, the Commissioners removed from the offices occupied by them in Breck's building to the rooms provided for the department in the new City Hall.

Fifty-six plumbers' licenses were issued during the year 1878, all of which expired on the last day of the year.

During the year 1878 there was purchased for use in laying service pipes about twenty-five tons of lead pipe, of various sizes, at prices varying from four and three-twentieths to four and three-quarters cents per pound.

Under the advice of the City Solicitor the rent for the wharf leased of the Point Street Iron Works has not been paid since April 30th, 1878, notice having been given to the city by the attorney of James Campbell that Mr. Campbell claims a portion of the property. The question of ownership is still before the court.

The walk on Hope Reservoir embankment has been concreted, which adds much to the convenience and comfort of the public and materially reduces the cost of maintenance. The work was done by the Rhode Island Concrete Company.

The Cornish Engine has not been run since January 23, 1879. The settling of the foundation caused by the action of the pump has resulted in a partial giving away under the beam wall and a portion of the main building, and in its present condition the Commissioners deem it unadvisable to keep the engine in regular use. Pending the consideration of proposed methods of remedying the defect, it is the intention of the Commissioners to run it only in the event of an accident to the Worthington Engine, or, as necessity may require.

During the year 1878 the Cornish Engine was run 2,833 hours and the Worthington Engine 1,807 hours.

The Worthington Engine is in good condition and is now performing all the duty required of it without additional cost.

The engines at Hope Station are in good condition.

Much valuable assistance has been rendered the Water Commissioners by the City Engineer's Department in the way of inspecting and superintending the work done by the Water and Sewer Departments, which, though not strictly engineering, nevertheless could, in the opinion of the Commissioners, better be performed for the best interests of the city by that department, in connection with the engineering, than by employing additional help.

WATER PIPES.

The following statement shows the lengths of pipes laid during the year 1878; the sizes of the pipes, and where laid:

20-INCH.

In Adelaide avenue, - - - 242. feet.

16-INCH.

In Charles street, - - - 374. feet.

12-INCH.

In Branch avenue and Charles street, 2,387. feet.

8-INCH.

In Admiral, Veazie and West River streets,
and in Branch and Douglas avenues, - 5,007. feet.

6-INCH.

In Ann, Bernon, Bates, Calais, Cedar, Coles, Congdon, Cromwell, Crout, Curtis, D, Dover, Evans, Fruit, First street north of India, Furnace, Gallup, Gardiner, Graham, Hanover, Harriet, Hill, (3d ward,) Hill, (8th ward,) Jewett, Liberty, Locust, Mallett, Meeting, North Davis, Otis, Pacific,

Peace, Piedmont, Plenty, Plain, Prescott,
 Republican, Rodman, Salisbury, Senter,
 Shamrock, Taylor, Thayer, Valley, Web-
 ster and Zone streets, and in Branch, Lin-
 wood and Metcalf avenues, - 18,944.43 feet.

Total, - - - - - 26,954.43 feet.
 or 5.105 miles.

Total length of all sizes laid to December 31, 1878, inclu-
 sive, 787,501.27 feet, or 149.1478 miles.

FIRE HYDRANTS.

Thirty-three hydrants were set during the year 1878, one
 in each of the following locations :

Admiral street, north side, opposite east line of Whipple
 street.

Bates street, south side, about 370 feet west of Mallett street.

Bates street, south side, about 120 feet from turn in street.

Branch avenue, south side, about 96 feet west of West River
 street.

Branch avenue, north-west corner of Flora street.

Branch avenue, north-west corner of Luna street.

Branch avenue, south-west corner of Hawkins street.

Branch avenue, south side, opposite east line of Randall
 avenue.

Branch avenue, south side, opposite the tower of Wanskuck
 Mill.

Charles street, east side, 255 feet north of Admiral street.

Charles street, east side, 675 feet north of Admiral street.

Charles street, east side, 1,113 feet north of Admiral street,
 opposite Silver Spring Bleachery.

Charles street, north-west corner of Borva street.

Coles street, north-west corner of Hope street.

Cromwell street, south side, about 430 feet west of Green-
 wich street.

D street, east side, 217 feet south of Lester street.
Dover street, north side, about half-way between Academy
avenue and Pemberton street.
Dover street, north side, about half-way between Pemberton
and Carleton streets.
Jewett street, north side, about half-way between Calais and
Aster streets.
Mallett street, east side, opposite south line of Bates street.
Metcalf avenue, north-west corner of Rodman street.
North Davis street, south side, about 220 feet north from
Douglas avenue.
Peace street, south-west corner of Greenwich street.
Plain street, north-west corner of Salisbury street.
Plenty street, south side, about 475 feet west of Broad street.
Republican street, east side, about half-way between Adams
and Gesler streets.
Senter street, north-westerly corner of Jewett street.
Valley street, north-west corner of Calais street.
Valley street, north side, about 205 feet west of Senter
street.
Veazie street, north-west corner of Prescott street.
Webster street, north-west corner of Clark street.
Zone street, north-east corner of Chalkstone avenue.
First street north of India street, north side, about 62 feet
east of Brook street.

The total number of fire hydrants December 31, 1878, was
eleven hundred and three.

WATER METERS.

There were in use at the close of the year the following
water meters :

KIND.	SIZES.							Total.
	$\frac{1}{8}$ in.	$\frac{3}{8}$ in.	1 in.	1 $\frac{1}{2}$ in.	2 in.	3 in.	4 in.	
Ball & Fitts, Piston	2,266	439	124	48	8	1	.....	2,886
Ball & Fitts, Rotary .....	.....	.....	1	7	2	4	3	17
Worthington.....	165	.....	.....	.....	.....	.....	1	165
Fales, Jenks & Sons.....	322	216	23	4	11	.....	3	579
	2,753	655	148	59	21	5	7	3,648

APPLICATIONS FOR WATER.

The total number of applications for a supply of water to December 31, 1878, inclusive, was ninety-three hundred and forty-seven.

SERVICE STOPS.

The number of service stops opened to December 31, 1878, inclusive, was eighty-five hundred and sixty-six.

The following table shows the number of service stops, opened by months, from the commencement to December 31, 1878, inclusive :

MONTHS.	1871.	1872.	1873.	1874.	1875.	1876.	1877.	1878.
January.....		54	33	21	34	55	15	49
February.....		47	18	18	7	25	23	18
March.....		38	34	63	7	45	32	60
April.....		109	109	108	32	108	82	78
May.....		224	206	147	162	168	136	95
June.....		329	295	151	172	148	114	108
July.....		333	261	127	141	158	83	80
August.....		224	209	123	83	94	91	51
September.....		184	147	139	101	94	80	63
October.....		138	135	160	92	84	81	78
November.....		100	104	185	86	54	73	57
December.....	56	83	45	122	60	35	55	45
	56	1,863	1,596	1,364	977	1,068	865	777

During the year 1878 one hundred and twenty-two stops were closed for non-payment of bills, ninety-seven of which were re-opened; in ninety cases the bill and penalty of two dollars were paid, and seven by reason of attendant circumstances were re-opened on payment of bills without penalty. Seventeen stops closed for non-payment previous to 1878, were re-opened; the bills and penalty of two dollars each were paid in thirteen instances, and the remaining four by reason of attendant circumstances were re-opened without penalty.

One stop closed for non-payment was permanently closed on payment of bill and a charge of five dollars.

Sixty-eight stops closed for non-payment remained unopen at the close of the year.

Twenty-three stops were permanently closed. Total number permanently closed to December 31, 1878, inclusive, sixty-seven.

Six stops were removed. Two stops previously reported as removed were replaced. Total number removed to December 31, 1878, inclusive, thirty-five.

In two cases where there was no stop cock on the premises a charge of two dollars each was collected for closing and re-opening stop.

At the close of the calendar year 1878, there were in use eighty-one hundred and twenty-two stops.

USES OF WATER.

Water was, on the 31st day of December last, supplied for the following uses:

7 armories; 19 bakeries; 40 banks; 178 bar-rooms; 2 bath-houses; 132 boarding-houses; 1 bonnet bleachery; 16 bottling establishments; 17 building purposes; 2 burying grounds; 1 burnisher; 2 car-houses; 4 carriage depositories;

5 catch basins; 4 chasers; 43 churches; 1 city barn; 2 city bridges; 2 city buildings; 20 city drinking fountains; 39 city drinking troughs; 1,103 city fire hydrants; 15 city fire steamer and hose stations; 14 club rooms; 14 coal yards; 1 college; 1 colored shelter; 4 convents; 2 court houses; 1 decorator; 1 Dexter asylum; 3,342 dwellings of one family; 4,088 dwellings of two families; 374 dwellings of three families; 489 dwellings of four families; 65 dwellings of five families; 71 dwellings of six families; 9 dwellings of seven families; 7 dwellings of eight families; 1 dwelling of nine families; 1 dwelling of ten families; 1 dwelling of twelve families; 2 dwellings of twenty-four families; 6 dye houses; 29 elevators; 1 engine turner; 7 engravers; 2 enamel works; 1 express carriage house; 70 fire supplies, private; 77 fountains, private; 2 fountains, public; 1 furrier; 4,126 garden and street hydrants; 4 gas holders; 6 gold and silver refiners; 5 gold and silver platers; 2 grain elevators; 62 green houses; 26 halls; 1 home for aged men; 1 home for aged women; 2 hospitals; 18 hotels; 9 laundries; 6 libraries; 1 lithographer; 25 lodging-houses; 2 lumber dealers; 1 mason. *Manufacturing Establishments*,—1 alarm till; 1 asphalt block; 4 beer; 2 belt and picker; 3 blank book; 2 bleacheries; 2 bologna sausage; 2 boot and shoe; 2 box; 1 braiding works; 3 brass foundries; 2 breweries; 1 brush; 2 butt; 11 carriage; 2 cement pipe; 1 chain; 3 chemical; 10 cigar; 1 cigar box; 20 cloak and dress; 1 coffin; 10 confectionery; 1 corset; 5 colorers of jewelry; 9 cotton; 2 crocus; 1 cutlery; 4 die sinkers; 2 dye wood; 1 emery wheel; 4 enamellers of jewelry; 1 eyelet; 4 file; 9 furniture; 1 gas; 1 gas burner; 4 gas fixtures; 1 gas stove; 1 geer; 6 hat; 11 harness; 4 ice cream and soda water; 1 iron company; 1 iron fence; 12 iron foundries; 1 jewelers' cards; 112 jewelry; 4 lapidaries; 32 machinists; 1 mowing machine; 1 nail keg; 3 oil; 1 organ; 1 paper box; 1 paper collar; 4 paper cop tube; 2 pattern; 4 patent medicine; 1 pencil case; 4 picture frame; 2 paint works; 2 pump; 2 reed; 1 rubber; 2 rubber goods; 1 sail;

5 sash and blind; 1 saw; 3 screw; 1 sheet iron; 1 shell comb; 2 shirt; 3 silver ware; 6 soap; 1 spiral spring; 1 starch; 1 steam boiler; 2 steam engine; 1 stencil plate; 1 stove; 2 tanners; 2 thread; 3 tin ware; 3 tool; 2 top roll; 1 wire work; 7 woolen goods; 1 yeast. *Markets*.—69 fish; 136 meat. *Mills*.—3 drug and grain; 4 flour and grain; 11 planing. 4 motors; 3 nickel platers; 2 opera house; 2 orphan asylums; 9 organs; 7 oyster houses; 842 offices; 12 photographers; 14 printing establishments; 11 plaster and stucco workers; 20 plumbers; 11 provision curers and packers; 6 police stations; 7 railroads; 2 reading rooms; 59 restaurants; 1 roofer. *Saloons*.—4 billiard; 2 bowling; 4 ice cream; 29 lager beer; 10 oyster. *Schools*.—1 boarding; 18 private; 42 public; 1 reform. *Shops*.—65 barber; 18 blacksmith; 1 carpenter; 5 cooper; 3 gunsmith; 1 junk; 25 paint; 22 shoemaker; 30 tailor; 5 tinmen. 4 slaughter houses. *Stables*.—6 hack; 47 livery; 433 private; 6 sale; 100 work. 1 state house; 13 steamboats; 13 steamships; 7 steam and gas pipe fitters. *Stores*.—2 agricultural implements; 55 apothecary; 1 auction; 4 book; 35 boot and shoe; 1 bread; 2 carpet; 3 carriage trimmings; 1 chemical; 10 cigar; 26 clothing; 17 confectionery; 2 crockery; 3 drug; 47 dry goods; 87 fancy goods; 1 florist; 16 flour and grain; 12 fruit; 15 furniture; 13 gents' furnishing goods; 204 grocery, retail; 15 grocery, wholesale; 13 hardware; 2 hide and leather; 2 hoop skirt; 10 house furnishing goods; 3 house paper; 3 iron and steel; 18 jewelry; 15 liquor; 1 lime and brick; 2 manufacturers' supplies; 37 millinery; 12 newspaper; 4 oil and paint; 3 paper and paper stock; 2 piano-forte; 8 produce, wholesale; 4 sewing machine; 4 stationery; 3 stove; 8 tea; 2 trunk; 1 toy; 1 umbrella; 1 wooden ware; 1 tool; 4 woolen goods. 3 sidewalk lifts; 1 state prison; 1 store house; 8 stone cutters; 1 theatre; 4 undertakers; 1 United States custom house building; 7 upholsterers; 5 urinals, public; 2 water boats; 1 wharf; 1 wheelwright; 1 wood turner; 10 wood yards; 42 not classed.

The amount of expenditures on account of Water Works, during the year 1878, was—

For construction and extension.....\$50,817 35

Classified as follows, viz.:

Cast iron water pipes.....	\$18,250 42
Laying water pipes.....	6,382 22
Stop valves, boxes and covers.....	5,717 68
Laying service pipes.....	3,646 94
Pettaconset pumping station, for land....	2,500 00
Service pipe.....	2,491 78
Superintendence of pipe work and service stops.....	1,920 58
Clerks' salaries.....	1,775 04
Special castings.....	1,657 25
Labor on and carting pipes.....	1,101 60
Horse and wagon account (keeping, shoeing, etc.).....	976 35
Commissioners' salaries.....	900 00
Taps and stops.....	780 58
Wharf expenses, rent.....	\$625 00
expenses.....	89 41
Rent of offices.....	664 41
Secretary's salary.....	652 20
Tools.....	575 04
Public drinking fountains and troughs....	224 59
Line of leading mains, for damages.....	220 12
Tide gauge reports.....	175 00
Printing and advertising.....	75 75
Hydrant bolts.....	72 56
Sundries.....	71 71
Books, stationery, etc.....	18 53
	17 00
	<u>\$50,817 35</u>

For maintenance.....\$74,090 12

Classified as follows:

PETTACONSET PUMPING STATION.

Coal and wood.....	\$4,699 98
Engineers.....	2,599 92
Amount carried forward.....	<u>\$7,299 85</u>

Amount brought forward.....	\$7,299 85
Firemen.....	2,399 77
Sundries.....	922 87
Oil, tallow and waste.....	615 23
Labor on fuel.....	234 35
Cornish pumping engine and boilers.....	1,999 96
Stand pipe.....	920 63
Worthington pumping engine.....	569 68
Care of grounds, grading, etc.....	160 39
Repair of buildings.....	133 55
Bridge.....	10 75
Superintendence at Pettaconset and Socka- noset.....	628 35

\$15,895 33

SOCKANOSSET RESERVOIR.

Keeper's salary.....	\$914 38
Care of grounds, gate-houses, etc.....	178 73

\$1,093 11

HOPE PUMPING STATION.

Coal and wood.....	\$1,037 12
Engineers.....	2,728 00
Firemen.....	1,615 10
Lights.....	801 23
Oil, tallow and waste.....	521 12
Sundries.....	469 29
Engine-house, repairs and cleaning.....	347 81
Pumping engine, No. 1.....	5 00
Pumping engine, No. 2.....	3,414 87

\$10,939 54

HOPE RESERVOIR.

Keeper's salary.....	\$957 50
Care of grounds, gate-house, etc.....	523 24
Concreting walks.....	688 56

\$2,169 30

PIPE LINE.

Superintendence of pipe line and service stops.....	\$1,939 88
Repairs.....	3,873 72
Change of grades.....	191 25

\$5,994 85

COMMISSIONERS' OFFICE.

Clerks' salaries.....	\$4,599 96
Amounts carried forward.....	\$4,599 96

\$26,092 18

REPORT OF THE WATER COMMISSIONERS.

17

Amounts brought forward....	\$4,599 96	\$36,092 18
Examining water fixtures and collecting...	2,083 08	
Commissioners' salaries.....	1,800 00	
Secretary's salary.....	1,149 96	
Rent of offices	652 21	
Janitor's salary.....	594 00	
Printing and advertising.....	514 19	
Books, stationery, etc.	433 55	
Gas.....	59 20	
	<hr/>	\$11,836 15

MISCELLANEOUS.

Water meters and setting and repairing meters.....	\$14,430 68	
Taxes.....	9,860 35	
Real estate.....	390 33	
Analyses of water.....	497 81	
Superintendent's clerk.....	387 53	
Horse hire	276 51	
Telegraph lines.....	238 47	
Sundries.....	332 23	
Public drinking fountains and troughs.....	271 42	
Rain gauges.....	31 46	
	<hr/>	\$26,161 79
		<hr/>
		\$74,090 12

The amount of expenditures during the year 1878, was...	\$124,907 47
The total amount of expenditures to December 31, 1878, inclusive, was.....	5,339,915 59
The net expenditure for construction and extension in 1878, was.....	47,432 07
The net expenditure for construction and extension to December 31, 1878, inclusive, was.....	4,653,555 45
The net expenditure for maintenance in 1878, was.....	58,166 50
The net expenditure for maintenance to December 31, 1878, inclusive, was.....	321,606 10
The total amount of appropriations to December 31, 1878, was—	
For construction and extension.....	\$5,200,000 00
For maintenance from October 1, 1876..	225,000 00
	<hr/>
	5,425,000 00
The unexpended balances December 31, 1878, were—	
For construction and extension.....	\$19,464 51
For maintenance.....	62,235 26
	<hr/>
	81,699 77

The amount received during the year 1878, all of which
was paid to the City Treasurer, was.....

\$239,779 26

Classified as follows :

MAINTENANCE.

Water supplies.....	\$218,883 33	
Water meters.....	11,276 16	
Setting and repairing meters.....	3,724 20	
Rents.....	755 75	
Penalties.....	210 00	
Old iron from Hope pumping station.....	64 99	
Stone from mill site at Pawtuxet.....	49 13	
Grass from Hope reservoir.....	40 00	
Stone from Sockanosset reservoir.....	7 00	
Oil barrels from Hope pumping station..	5 00	
Sundries at Pettaconset.....	1 40	
		<hr/>
		\$235,016 95

CONSTRUCTION.

Rent of offices from City Engineer's Department.....	\$1,255 34	
Labor and materials, laying service pipes.	1,286 59	
Labor and materials, laying water pipes..	1,173 51	
Cast iron water pipes and specials.....	508 93	
Land at Pawtuxet.....	300 00	
Old iron	152 91	
Wharfage	52 97	
Sundries.....	32 06	
		<hr/>
		\$4,762 31

\$239,779 26

The total amount received for water to December 31, 1878,
inclusive, was.....

\$1,038,378 15

The amount of all receipts to December 31, 1878, inclu-
sive, was.....

\$1,401,518 42

The following is a statement of receipts for water, by
months, from commencement to December 31, 1878, inclu-
sive :

MONTHS.	1872.	1873.	1874.	1875.	1876.	1877.	1878.
January. ....	.....	\$40,699 09	\$69,356 70	\$92,102 10	\$106,847 71	\$124,146 05	\$141,006 51
February	\$796 06	4,314 80	3,678 96	4,674 19	2,939 71	5,502 98	5,166 46
March.	6,671 82	6,669 73	9,221 19	4,777 42	6,777 07	9,455 64	4,318 92
April.....	1,608 59	2,810 07	4,936 98	10,093 32	13,384 63	7,722 51	14,965 74
May.....	2,003 41	1,766 28	2,338 59	2,574 92	2,598 33	3,307 32	2,787 37
June	8,034 89	8,228 92	2,583 35	8,140 99	6,506 75	8,840 60	4,207 37
July....	3,488 27	6,214 24	13,756 51	9,035 23	14,055 90	9,350 82	14,758 89
August.....	1,818 14	1,441 09	1,953 37	4,001 66	2,324 74	3,295 96	2,872 26
September. ..	4,033 44	7,550 64	5,541 34	5,393 34	13,053 49	3,313 30	7,457 55
October.....	5,079 08	8,745 53	9,097 95	13,578 46	8,623 85	15,805 02	15,335 95
November. ...	477 04	872 83	1,511 03	1,291 59	908 43	1,050 65	900 39
December....	5,372 77	8,072 87	8,076 42	9,481 49	5,848 12	8,098 49	5,105 92
	\$41,003 51	\$97,386 09	\$132,052 39	\$165,144 71	\$183,868 73	\$200,039 39	\$218,883 33

The estimate made for maintenance of the works, for the financial year ending September 30th, 1879, was seventy-five thousand dollars, which amount it is now believed will be sufficient.

The amount needed for construction and extension depends largely upon the amount of work ordered by the city council.

SEWERS.

The following statements show the sewers ordered during the year 1878; the sewers completed during the same time and the cost of each :

**SEWERS ORDERED AND COMPLETED DURING THE YEAR 1878,
AND THE COST OF EACH.**

NAME OF STREETS.	BETWEEN WHAT POINTS.	DATE OF ORDER.	COST.
Aborn and Washington streets.	From Broadway to Washington and from Walker to Dorrance street, and thence to the cove basin.	October 1, 1878.....	\$6,307 24
Governor street.....	From Manning street to George street.....	May 6, 1878.....	1,246 08
Greenwich street.....	From Parkis avenue to West Friendship street.....	June 21, 1878.....	688 53
Hedley and Palmer streets.....	From Walling street to Pettis street.....	May 20, 1878.....	1,207 29
Jenkins and North Main streets	To Livingston street.....	September 12, 1878..	6,939 42
Olney street.....	From East avenue to Camp street.....	April 11, 1878.....	2,902 33
Park street.....	From Smith street to the Woonasquatucket river.	June 21, 1878.....	3,021 55
Pitman street.....	From Governor street to Ives street.....	April 15, 1878.....	473 30
Power street.....	From Hope street to Brook street.....	May 1, 1878.....	1,560 21
Spring street.....	From High School estate to Broad street.....	August 24, 1878.....	433 08
Trenton street.....	From Governor street to Ives street.....	May 31, 1878.....	900 66
West River and Whelden streets	From the summit in West River street to the Mosshassack river.....	September 16, 1878..	3,271 66

SEWER ORDERED PRIOR TO JANUARY 1, 1878, BUT COMPLETED DURING THE YEAR 1878, AND COST OF SAME:

NAME OF STREET.	BETWEEN WHAT POINTS.	DATE OF ORDER.	COST.
Bridgham street.....	From High street to Cranston street.....	October 11, 1877....	\$1,960 29

CATCH-BASINS AND OTHER WORK ORDERED BY THE CITY COUNCIL AND COMPLETED DURING THE YEAR 1878, WITH A STATEMENT OF THE COST OF SAME :

LOCATION.	DATE OF ORDER.	COST.
Exchange Place and Exchange street, (4 basins, etc.).....	October 16, 1878....	\$463 32
Cove street, opposite Fountain street, (1 basin).....	October 18, 1878....	76 70
Connections with sewers in streets around City Hall.....	October 14, 1878....	144 00
Connection with stone drain in Sabin street.....	October 1, 1878....	332 12

In addition to the above there was expended during the year 1878 :

For additional catch-basins on completed sewers, \$1,004 55

For catch-basins connected with old drains, 1,525 06

Work on the following sewers (completing the list ordered to be constructed by the Board of Water Commissioners,) had not, on the 31st day of December, 1878, commenced :

Dorrance street from the head of the dock to the end of the pier.

Greene street, from Washington street to Westminster street.

Maple and Plane streets, from Beacon street to South street.

State and Orms streets, from a point 100 feet northerly from Field street, to connect with sewer in Orms street.

On the 18th of November, 1878, the Water Commissioners were "directed to cause additional catch-basins to be placed in Lockwood street, provided that the consent of the owners of the adjoining property be first obtained." The work has not yet been commenced.

The amount of expenditures on account of sewers during the year 1878, was :

For construction.....\$42,329 03

Classified as follows :

Labor and materials, constructing sewers.....	\$86,708 02	
Salaries and Office expenses.....	3,197 03	
Inspection of connections.....	968 70	
Rent of offices.....	652 21	
Rent of wharf and pipe yard.....	625 00	
	<hr/>	<hr/>
Amounts carried forward.....	\$42,150 96	\$42,329 03

Amounts brought forward.....	\$42,150 96	\$42,329 03
Buildings at pipe yard.....	118 91	
Books, stationery, etc.....	32 24	
Printing.....	81 92	
	<hr/>	
	\$42,329 03	

For maintenance.....\$14,248 60

Classified as follows :

Cleaning catch-basins and sewers....	\$10,838 83
Superintendence of cleaning and repairs..	1,100 04
Cleaning and repairing old drains.....	1,277 89
Repairing catch-basins and sewers.....	710 45
Building on cove lands	306 55
Alterations caused by change of grades...	19 84
	<hr/>
	\$14,248 60

Total.....\$56,577 63

The amount received by the sewer department, during the year 1878, all of which was paid to the City Treasurer, was..... \$1,183 78

The following table exhibits the length and sizes of sewers constructed under the present system :

Size in inches.	Kind.	YEAR.								Totals.
		1871.	1872.	1873.	1874.	1875.	1876.	1877.	1878.	
66x72	Brick							530.04		530.04
40x60	do.			2,354.46						2,354.46
38x57	do.			405.20			2,305.95			2,891.15
36x54	do.			3,005.33						3,005.33
34x51	do.	594.50								594.50
32x48	do.				410.85					410.85
30x45	do.				98.00		2,170.35	647.78		2,916.13
28x42	do.	1,509.11			2,190.67					3,780.78
26x30	do.		242.48	374.97	984.70					1,602.15
24x36	do.			1,537.06	631.29	2,181.40	368.80			4,719.15
22x33	do.	1,412.89			1,217.79	1,070.21	1,208.42		70.70	5,040.01
20x30	do.			435.17	3,187.27	903.40	1,628.92			6,244.76
18x26	do.								142.00	142.00
16x24	do.	482.00								482.00
66	do.			1,562.60			2,462.95			4,025.55
54	do.						250.00			250.00
48	do.				1,314.70		203.02	100.00		1,707.72
40	do.							568.25		568.25
36	do.							195.80		195.80
30	do.							349.17		349.17
24	do.			3.00	261.89	806.87		284.74	483.50	1,920.00
22	do.		891.13	813.11	672.62	3,196.32	255.13	1,003.30	132.83	7,624.44
20	do.		245.98	2,072.00	1,952.41	3,255.68	1,781.48		371.72	9,679.27
18	do.		255.40	1,507.18	3,607.32	4,526.74	429.38	361.90		10,587.92
16	do.		455.22	2,202.39		1,401.45				4,069.06
18	Pipe.	46.00	27.00	229.55	825.71					1,128.26
16	do.	111.00	1,402.98	1,819.63	7,220.95	4,565.00	2,418.59	538.90	1,703.10	19,840.15
12	do.	1,828.75	8,253.23	17,002.68	39,199.38	33,037.28	8,080.17	11,902.20	7,787.95	128,291.70
8	do.			219.30						219.30
Totals in feet...		6,074.25	11,773.42	36,324.23	63,675.55	55,123.35	24,403.16	17,142.74	10,751.80	225,268.50
Totals in miles..		1.15	2.23	6.88	12.00	10.44	4.62	3.24	2.036	42.665
Catch-basins....	71	83	281	508	380	144	128	108	1,703	
Man-holes.....	34	115	346	700	613	233	163	110	2,314	
Lamp-holes.....				19	91	34	12	4	100	
Private drains laid.....	28	39	261	522	576	449	383	308	2,566	

The Commissioners have, during the past year, by advice of the City Engineer, constructed all sewers in new districts of sufficient size to carry an influx of not less than one-inch rain-fall per hour, in addition to sewage, and inasmuch as the cost does not increase in proportion to the capacity, the Commissioners think, in view of the frequent overflows in various parts of the city, it is not prudent to build of less size. Where the Commissioners have constructed extensions and laterals to sewers they have laid such sizes as would conform to the trunk sewers already built.

On the 25th day of November last, the following resolu-

tion was adopted, and a copy mailed to each licensed drain-layer :—

“ *Resolved*, That all drain-layers' licenses now in force shall expire on the 31st day of December, 1878, and all licenses issued hereafter shall be for the term ending December 31, next following their issue.”

EMPLOYEES.

The following is a detailed statement of the salaries paid to the employés of the Commissioners :

Clinton D. Sellew, secretary,	compensation, \$2,300 00 per annum.
Philip S. Chase, book-keeper,	“ 1,700 00 “ “
Thomas C. Gushee, clerk,	“ 1,100 00 “ “
William H. Turner, clerk.	“ 1,100 00 “ “
Walter F. Slade, clerk,	“ 900 00 “ “
Leonard N. Austin, Jr., clerk,	“ 850 00 “ “
Jesse W. Coleman, clerk,	“ 700 00 “ “
Frederic A. Arnold, exam'r of water fixtures and collector,	“ 1,100 00 “ “
Albert C. Winsor, asst. exam'r of water fixtures and collect'r,	“ 875 00 “ “
Andrew B. Purdy, superintendent of pipe work,	“ 1,600 00 “ “
S. Horace Wheeler, superintendent of service pipe work,	“ 1,300 00 “ “
William F. Janes, in charge of service stops,	“ 900 00 “ “
Edward A. Moran, superintendent of meter work,	“ 1,100 00 “ “
Richard M. Wood, clerk at pipe yard,	“ 900 00 “ “
William H. Patterson, foreman of pipe laying,	“ 1,000 00 “ “
Horatio L. Briggs, supt. at Pettaconset and Sockanosset,	“ 1,000 00 “ “
Slimeon Noell, pumping engineer at Pettaconset,	“ 1,600 00 “ “
William Harry, pumping engineer at Pettaconset,	“ 1,000 00 “ “
John Hamilton, fireman at Pettaconset,	“ 1,000 00 “ “
James Hamilton, fireman at Pettaconset,	“ 2 00 per day.
Jeptha Baker, keeper of Sockanosset reservoir,	“ 2 50 “ “
John Quinn, pumping engineer at Hope station,	“ 1,500 00 per annum.
Joseph F. Plant, pumping engineer at Hope station,	“ 1,200 00 “ “
Michael Hamill, fireman at Hope station,	“ 65 00 per month.
Judson Davis, fireman at Hope station,	“ 65 00 “ “
Alexis C. Miller, keeper of Hope reservoir,	“ 2 50 per day.
Allen Aldrich, supt. of cleaning and repairs of sewers,	“ 1,100 00 per annum.
William T. Barton, 2d, superintendent's clerk,	“ 300 00 “ “

Trial balances of ledgers, December 31st, 1878, and the report of the Engineer and Superintendent are hereunto appended and made parts of this report.

L. BRAYTON,	} <i>Board of</i>
HENRY L. PARSONS,	
N. F. POTTER,	

Water Commissioners.

TRIAL BALANCE OF LEDGER, DECEMBER 31, 1878.

DR.

CONSTRUCTION.

<i>Providence Water Works, for construction,</i>	\$4,655,541 44
<i>A. & W. Sprague Manufacturing Co. :</i>	

(Due from said company on account of grading a portion of Reservoir avenue, as per the written agree- ment of the company,)	\$2,500 00
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<i>R. O. Peck,</i>	71 77	
	<hr/>	2,571 77

City Treasurer :

(Payments to him for receipts for labor, materials, engineering ser- vices on sewers, other expenses in- curred by Water Works, for sew- ers, etc.,)	322,572 47
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MAINTENANCE.

<i>Providence Water Works, for Maintenance,</i>	321,606 10
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City Treasurer :

(Payments to him for labor and mate- rials, water meters, rents, etc.,)	40,567 80
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City Treasurer :

(Total amount of receipts for water,)	1,038,378 15	
	<hr/>	\$6,381,237 73

CR.

<i>Warren Foundry and Machine Co.,</i>	1,985 99	
<i>Penalties,</i>	968 00	
<i>Water,</i>	1,038,378 15	
<i>Approved bills,</i>	5,339,915 59	
	<hr/>	\$6,381,237 73

TRIAL BALANCE OF LEDGER, SEWER DEPARTMENT, DEC. 31, 1878.

PAGE.		Dr.	Cr.
11	Engineering department, to March 10, 1877, - - -	\$3,614 84	
16	City Treasurer, - - - - -	13,991 97	
30	Books, stationery, etc., - - - - -	176 45	
33	Removal to Point street wharf, - - - - -	624 96	
34	Tools, - - - - -	5,525 53	
38	Catch-basin traps, - - - - -	442 74	
40	Catch-basin covers, - - - - -	432 45	
42	Flag stones, - - - - -	597 73	
43	Paving stones, - - - - -	33 27	
44	Bricks, - - - - -	1,381 51	
47	Sewer pipes, rings, covers, etc., - - - - -	5,376 96	
49	Grated covers, - - - - -	94 36	
51	Catch-basin stones, - - - - -	3,063 96	
53	Man-hole frames and covers, - - - - -	3,682 37	
58	Lamp-hole frames and covers, - - - - -	360 03	
78	Stones from Brook street sewer, - - - - -	2,088 31	
78	Carting stones from sewers to cove lands, - - - - -	1,932 62	
80	Iron rods, - - - - -	13 93	
80	Rent of wharf and pipe yard, - - - - -	2,574 29	
81	Iron sewer connections, - - - - -	21 04	
82	Invert blocks, - - - - -	3,726 44	
94	Sheet piling, - - - - -	367 84	
105	Printing, - - - - -	3,253 56	
124	Inspection of connections, - - - - -	10,199 08	
128	Buildings at pipe yard, - - - - -	809 96	
147	Salaries and office expenses, - - - - -	33,479 53	
191	Catch-basins in Exchange street and Exchange place, - - -	266 87	
322	John Gillen, - - - - -	15 30	
394	Catch-basin, cor. Aborn and West Exchange streets, - - -	7 42	
396	" " junction Broadway and Sabin street, - - -	6 75	
399	" " in Angell street, - - - - -	18 32	
458	" " " Cove street, opposite Fountain street, - - -	36 81	
459	Catch-basins " " " Exchange place and Fulton street, - - -	408 40	
460	" " around City Hall, - - - - -	268 88	
461	" " in Greenwich street, - - - - -	86 17	
462	" " " Benefit street, - - - - -	182 19	
463	" " " Fountain street, - - - - -	44 16	
464	" " " South Court street, - - - - -	208 82	
466	Connections with Sabin street drain, - - - - -	238 27	
467	Catch-basins in Sabin street, - - - - -	475 88	
468	" " " Canal street, - - - - -	109 31	
	Amount carried forward, - - - - -	\$100,368 29	

REPORT OF THE WATER COMMISSIONERS.

27

PAGE.		DR.	CR.
	Amount brought forward,	\$100,358 29	
474	Sewer in Brook street district, east of Ives street,	13,908 38	
477	" " " " " west " " "	13,506 38	
479	" " Manton avenue, from Malden street to the river,	4,834 86	
484	Additional catch-basins,	10 00	
486	Sewer in Bridgham street, from Cranston to High street,	1,890 77	
487	" " Power street, from Hope to Brook street,	1,095 00	
488	" " Olney street, from East avenue to Camp street,	2,825 72	
489	" " Pitman street, from Governor street to Ives street,	460 72	
490	" " Governor street, from Manning to George street,	1,212 74	
491	" " Trenton street, from Governor to Ives street,	880 03	
492	" " Greenwich street, from Parkis avenue to West Friendship street,	665 99	
493	" " Park street, from Smith street to Woonasquatucket river,	3,375 20	
494	" " Spring street, from near Pond to Broad street,	410 80	
495	" " Hedley and Palmer streets,	589 10	
496	" " Jenkins and North Main streets,	3,689 41	
497	Storm sewer in Washington and Aborn streets,	4,971 65	
498	Sewer in West River and Whelden streets,	2,180 83	
499	Catch-basins on old drains,	5,346 89	
502	Completed sewers,	939,659 72	
510	Maintenance of sewers,	66,310 06	
513	Approved bills,		\$1,170,295 34
		<u>\$1,170,295 34</u>	<u>\$1,170,295 34</u>

REPORT
OF THE
SUPERINTENDENT AND ENGINEER.

REPORT.

CITY ENGINEER'S OFFICE, CITY HALL,
PROVIDENCE, R. I., January 31, 1879. }

To the Board of Water Commissioners:

GENTLEMEN :—Agreeable to Section 7 of an ordinance approved March 10, 1877, I respectfully submit the following report:—

WATER WORKS.

Water pipes have been laid in the following streets during the year 1878:

Name of Street.	Between What Points.	Water turned on	Sizes and Lengths of Pipe Laid.				
			6 inch.	8 inch.	12 inch.	16 inch.	20 inch.
Ann street.....	Wickenden and India street.....	April 15..	525.75	.....	.....	.....	.....
Admiral street....	Charles and Whipple street.....	May 18..	.....	496.00	.....	.....	.....
Adelaide avenue..	Reservoir and Elmwood avenues...	July 27..	.....	.....	.....	.....	242.00
Bernon street....	Candace and Nolan street.....	Sept. 14..	163.50	.....	.....	.....	.....
Branch avenue....	Smithfield ave. and Silver Spring st	Nov. 1..	.....	.....	1,255.00	.....	.....
" "	Silver Spring st. and Woodward road.....	" 8..	.....	3,743.00	.....	.....	.....
" "	Woodward road and Rodman street	" 13..	1,501.00	.....	.....	.....	.....
Bates street.....	Mallett street and a point westerly..	" 27..	932.00	.....	.....	.....	.....
Calais street.....	Jewett and Valley street.....	June 14..	242.00	.....	.....	.....	.....
Cedar street.....	Acorn and Crout street.....	Oct. 14..	138.00	.....	.....	.....	.....
Charles street....	Admiral st. and a point northerly..	May 16..	.....	.....	1,132.00	.....	.....
" "	Burt and Admiral street.....	May 20..	.....	.....	.....	374.00	.....
Coles street.....	Ann and East street.	April 11..	422.10	.....	.....	.....	.....
Congdon street...	Hidden and Halsey street.....	May 6..	302.00	.....	.....	.....	.....
Cromwell street...	Greenwich and Dexter street.....	Sept. 14..	428.00	.....	.....	.....	.....
Crout street.....	Cedar street and Atwell's avenue..	Oct. 18..	597.00	.....	.....	.....	.....
Curtis street.....	Metcalf avenue and Salisbury street	Nov. 15..	455.00	.....	.....	.....	.....
Carried forward.....			5,736.35	4,239.00	2,387.00	374.00	242.00

Name of Street.	Between What Points.	Water turned on	Sizes and Lengths of Pipe Laid.				
			6 inch.	8 inch.	12 inch.	16 inch.	20 inch.
	Brought forward.....		5,736.35	4,230.00	2,387.00	374.00	282.00
D street.....	Lester street and Booth's lane.....	Oct. 26..	405.00				
Dover street.....	Academy avenue and Carleton st.....	" 5..	1,030.00				
Douglas avenue.....	Veazie street and a point easterly.....	" 19..		82.00			
Evans street.....	Webster and Martin street.....	June 6..	200.50				
Fruit street.....	Harriet street and Prairie avenue.....	" 17..	52.00				
First street north of India street.....	Traverse and Ann street.....	Sept. 23..	711.00				
Furnace street.....	India street and a point northerly.....	April 10..	16.00				
Gallup street.....	Broad street and Prairie avenue.....	June 26..	415.70				
Gardiner street.....	Camp and Knowles street.....	May 27..	379.00				
Graham street.....	Jenkins street and a point northerly.....	Sept. 12..	180.60				
Hanover street.....	Extended easterly.....	May 3..	23.70				
Harriet street.....	Oxford and Fruit st.....	June 17..	400.50				
Hill street.....	Front and India street.....	April 17..	379.50				
"	Perry street and a point westerly.....	Oct. 19..	129.00				
Jewett street.....	Senter street and the old city line.....	June 13..	665.50				
Liberty street.....	Smith and Jefferson st.....	" 8..	378.10				
Locust street.....	Camp and Cypress st.....	July 17..	257.00				
Linwood avenue.....	Extended easterly.....	Sept. 27..	202.30				
Mallett street.....	Olney and Bates street.....	Nov. 29..	307.00				
Meeting street.....	Congdon street and a point westerly.....	May 29..	81.50				
Metcalf avenue.....	Rodman and Curtis street.....	Nov. 14..	265.00				
North Davis st.....	Martin street and Douglas avenue.....	July 6..	727.00				
Otis street.....	North Main and Canal street.....	Oct. 25..	273.00				
Pacific street.....	Broad street and a point westerly.....	June 25..	364.50				
Peace street.....	Greenwich street to a point westerly.....	June 19..	16.80				
Piedmont street.....	Adams and Gesler st.....	Oct. 21..	131.00				
Plenty street.....	Broad and Greenwich street.....	June 22..	732.00				
Plain street.....	Potter's avenue and Public street.....	Sept. 25..	645.00				
Prescott street.....	Salsbury and Veazie street.....	Nov. 16..	442.00				
Republican street.....	Adams and Gesler st.....	Oct. 19..	74.80				
Rodman street.....	Branch and Metcalf avenues.....	Nov. 13..	228.00				
Salsbury street.....	Curtis and Prescott street.....	" 15..	266.00				
Senter street.....	Smith and Valley street.....	April 20..	468.53				
Shamrock street.....	Brook and Benefit street.....	April 8..	479.75				
Taylor street.....	Harvard and Wesleyan avenues.....	Sept. 19..	320.00				
Thayer street.....	John and Arnold street.....	April 19..	265.10				
"	Arnold and Transit street.....	June 29..	197.50				
Valley street.....	Calais street to a point westerly.....	" 14..	27.50				
"	Senter street to a point westerly.....	July 23..	317.70				
Veazie street.....	Prescott street and Douglas avenue.....	Nov. 19..		529.00			
Webster street.....	Evans street easterly to Providence and Worcester B. R.....	June 5..	532.60				
West River street.....	Elk and Burke street.....	Sept. 14..		157.00			
Zone street.....	Orms street and Chalkstone avenue.....	Oct. 22..	311.00				
	Totals.....		18044.43	5,007.00	2,387.00	374.00	282.00

Included in the foregoing are the following cut pipes, branches, gates, etc. ;

[illegible]

The following table shows the hydrants set on the various sizes of pipe during the several months of the year :

MONTHS.	SIZES OF PIPE WHERE SET.				
	6 inch.	8 inch.	12 inch.	16 inch.	Totals.
January.....	1	.....	.....	.....	1
February.....	.....	.....	.....	.....	.....
March.....	.....	.....	.....	.....	.....
April.....	1	.....	.....	.....	1
May.....	.....	1	8	1	5
June.....	5	.....	.....	.....	5
July.....	3	.....	.....	.....	3
August.....	.....	.....	.....	.....	.....
September.....	5	.....	.....	.....	5
October.....	2	.....	.....	.....	2
November.....	5	5	1	.....	11
December.....	.....	.....	.....	.....	.....
Totals.....	22	6	4	1	33

The total number of hydrants set to January 1, 1879, is 1,103, including 19 in the town of Johnston.

Blow-off connections have been laid at the following places :

Greenwich street, corner of Daboll street, from 30 inch main, 26.80 feet 8 inch pipe.

Eddy street, corner of Lockwood street, from 30 inch main, 9.80 feet 8 inch pipe.

Washington street, corner of Mathewson street, from 30 inch main, 5.40 feet 8 inch pipe.

Thayer street, corner of Waterman street, from 30 inch main, 9.70 feet 8 inch pipe.

The six inch pipe in Charles street, from Randall square to the old city line, has been taken out and 1,190 feet of sixteen inch pipe substituted therefor.

The six inch pipe in Valley street, from Helme street, two

hundred and six feet northerly, has been changed to conform to the new line of street.

Following is a statement of the length of each size of water pipe in the ground January 1st, 1879, considered as mains :

SIZE OF PIPES.	Length in Feet.	Length in Miles.
36 inch.....	10,084.00	1.9098
30 ".....	59,076 00	11.1886
24 ".....	23,942.00	4.5345
20 ".....	6,846.00	1.2966
16 ".....	28,685.40	5.4328
12 ".....	45,245.20	8.5691
10 ".....	10,507.00	1.9900
8 ".....	109,890.73	20.8126
6 ".....	492,581.94	93.2920
*4 ".....	648.00	0.1218
	787,501.27	149.1478

* At Pipe Yard and Roger Williams Park.

Gate-boxes and hydrants in the following places, have been changed to accommodate highway work :

GATE-BOXES CHANGED.

- 1 at the corner of Congdon and Meeting streets.
- 1 " " " South Main and Hopkins streets.
- 1 " " " Olney and Camp streets.
- 1 " " " Power and Brook streets.
- 1 " " " Borden and Clay streets.
- 1 " " " Friendship and Beacon streets.
- 1 " " " Hospital and Point streets.
- 1 " " " Stewart and Friendship streets.
- 1 " " " Blackstone and Eddy streets.
- 1 " " " Public and Plain streets.
- 1 " " " Public and Eddy streets.
- 1 " " " Ives and Bower streets.
- 1 " " " Ives and Trenton streets.
- 1 " " " Ives and Williams streets.
- 1 " " " George and Governor streets.
- 2 " " " Gano and Manning streets.

1	at the corner of	Pitman and Governor streets.
1	"	" " Power and Governor streets.
1	"	" " Angell and Governor streets.
2	"	" " Waterman and Brook streets.
1	"	" " Eddy and Bishop streets.
1	"	" " Eddy and Rhodes streets.
1	"	" " Plain and Rhodes streets.
1	"	" " Plain and Bishop streets.
1	"	" " Greenwich and Warren streets.
1	"	" " Steeple and North Main streets.
4	"	" " Greenwich and Daboll streets.
1	"	" " Greenwich and Henry streets.
1	"	" " Jewett and Holden streets.
1	"	" " Clemence and Broad streets.
9	in streets around the City Hall.	

Total, 43

Forty iron gate-boxes were set in place of wooden boxes removed.

HYDRANTS CHANGED.

1	at the corner of	Dora and Taylor streets.
1	on	Dora street, near Broad street.
1	on	Atwell's avenue, near the Woonasquatucket river.
1	at the corner of	Atwell's avenue and Eagle street.
1	on	Traverse street, between Shamrock and Pike streets.
1	"	" " " " " India streets.
1	at the corner of	Ives and Front streets.
1	on	Transit street, west of Thayer street.
1	at the corner of	Eddy and Fulton streets.
1	"	" " South Main and James streets.
1	"	" " Westminster street and McNeal lane.
1	on	Bacon street, east of Scott street.

Total, 12

The following Water Works material was used on account of the construction of the storm sewer in Washington street :

AT WHAT STREET.	LENGTH OF PIPE USED, IN FEET.				NUMBER OF SPECIALS USED.							
					SLEEVES.			TURNS.				
					8	10	12	Six-	QUARTER.			
	6	8	10	12				te'nth	6	8	12	
	inch.	inch.	inch.	inch.	inch.	inch.	inch.	inch.	inch.	inch.	inch.	inch.
Cove street.....	1.25	.....	7.5	.....	.....	1	.....	2	.....	.....	.....	.....
Union street.....	2.50	.....	.....	.....	.....	.....	.....	.....	4	.....	.....	.....
Clemence street. .	2.33	.....	.....	.....	.....	.....	.....	.....	4	.....	.....	.....
Beverly street.....	2.	.....	.....	.....	.....	.....	.....	.....	4	.....	.....	.....
Mathewson street...	.....	.....	.....	2.33	.....	.....	1	.....	.....	.....	4	.....
Aborn street.....	.....	8.50	.....	.....	1	.....	.....	.....	.....	4	.....	.....

Following is a statement of repairs made on distribution pipes, hydrants and street sprinklers, during the several months of the year :

MONTHS.	LEAKS IN DISTRIBUTION PIPES REPAIRED.							Hydrants Repaired.	Street Sprinklers Repaired.
	SIZE OF PIPE.						Totals.		
	4 inch.	6 inch.	8 inch.	12 inch.	24 inch.	30 inch.			
January.....			1				1	3	1
February.....		2					2		
March.....					1		1	16	1
April.....						1	1	4	
May.....								1	
June.....		1	1	1			3	1	
July.....	1	2	1	1			6		
August.....	1	3					4	12	
September.....		2				1	3	13	
October.....		1					1	1	
November.....		1					1	1	
December.....		3					3	50	
Totals.....	2	15	3	2	1	2	25	102	2

Of the hydrants repaired, ninety-seven have been furnished with improved valves, making the total number furnished with improved valves, three hundred and thirty.

Waste valves have been attached to all of the fire hydrants.

During the year water pipe has been laid for special cases ; the location, for whom laid, size of pipe and the purpose for which it was laid, is shown by the following table :

LOCATION.	FOR WHOM LAID.	Length of Pipe.			FOR WHAT PURPOSE LAID.
		4 inch.	6 inch.	8 inch.	
Aborn street.	Providence Steam and Gas Pipe Co.....	40.00	.....	.....	Automatic fire exting'ushr
Admiral street...	Oriental Mills.....	80.30	110.70	.....	Fire supply.
Branch avenue...	Wanskuck Co.....	.....	70.80	.....	Two fire supplies.
Charles street....	Silver Spring Bleaching and Dyeing Co	18.00	.....	.....	" "
Custom House st.	R. F. Vaughan.....	14.40	.....	.....	Two elevator supplies.
Dorrance street..	City of Providence at City Hall.....	52.80	107.70	.....	Fire and elevator supplies and meter room.
Fulton street....	H. T. and A. N. Beckwith	207.30	.....	.....	Fire and elevator supplies.
India street.....	New England Compressed Asphalt Block Co.	31.00	.....	.....	Fire supply.
Pettaconset.	Rhode Island State Prison Commission.....	.....	.....	111.00	Supply for State Farm and Prison.
Pine street.....	Waldron, Wightman & Co.	17.00	.....	.....	Elevator supply.
Union street.....	Ladd & Davis	26.00	.....	.....	Two elevator supplies.
Westminster st..	Lucia E. Brownell.....	5.20	.....	.....	Elevator supply.

Included in the foregoing are the following cut pipes, branches, gates, etc. :

KIND.	2½ inch.	4 inch.	6 inch.	8 inch.	6 to 4 inch.	Totals.
Cut pipes.....	9	11	2	.....	22
Branches.....	9	3	.....	12
Gates	3	9	3	2	.....	17
Quarter turns.....	13	.....	.....	.....	13
Sleeves.....	2	7	.....	.....	9
Caps.....	4	.....	.....	.....	4
Reducers.....	3	3

The above work is in charge of Andrew B. Purdy.

SERVICE PIPE WORK.

During the year seven hundred and eight new services have been laid ; the location of twelve changed ; ten substituted by larger pipe, two by smaller pipe, and three relaid where more pipe was needed.

The following shows the lengths and sizes of services and the number of taps, stops, and service boxes laid during the year :

MONTHS.	LENGTH OF SERVICES IN FEET.						NUMBER OF TAPS.						NUMBER OF STOPS.						Service Boxes Set.
	SIZE OF PIPE.						¾ inch.	¾ inch.	1 inch.	1½ inch.	Totals.	¾ inch.	¾ inch.	1 inch.	1 inch.	Totals.			
	¾ inch.	¾ inch.	¾ inch.	1 inch.	1½ inch.	Totals.													
January.....	103.9	328.7	52.3	26.0	28.8	639.7	8	17	2	1	1	29	8	21	2	1	33	33	
February.....	87.0	101.1	49.3	.....	14.0	261.4	6	7	3	.....	2	18	6	7	3	.....	2	18
March.....	120.4	464.4	147.4	.....	8.5	740.7	9	37	8	.....	1	55	9	38	8	.....	1	56
April.....	220.9	860.6	100.6	26.0	.....	1,208.1	13	56	7	1	.....	77	14	59	7	1	.....	81
May.....	259.3	620.0	186.0	6.8	33.3	1,114.0	14	42	10	1	2	69	14	47	10	1	2	74	
June.....	203.8	1,146.7	246.6	.....	.....	1,604.8	18	74	16	.....	1	109	20	79	17	.....	1	117
July.....	154.3	766.2	67.8	.....	23.2	1,019.5	9	45	5	.....	4	63	11	46	5	.....	4	66
August.....	128.7	586.8	77.7	25.4	8.6	826.2	7	30	6	1	1	45	7	32	6	1	1	47	
September....	129.9	521.9	179.2	8.2	4.3	843.5	11	32	10	1	1	55	11	35	10	1	.....	57
October.....	327.6	1,007.9	91.9	7.0	.....	1,434.4	18	83	6	1	.....	78	23	57	6	1	.....	87
November....	289.0	290.9	117.0	20.0	.....	716.9	16	22	10	1	.....	49	20	27	10	1	...	58
December....	96.0	196.6	120.8	.....	.....	414.4	4	12	8	.....	.....	24	5	16	7	.....	.....	29
Totals.....	2,209.8	6,881.8	1,436.6	119.4	120.7	36.3	153	427	91	7	13	671	148	404	91	7	12	722	
																		725	

Six service pipes have been removed for non-use during the year.

The following work was done for and charged to plumbers ;

Tapped the mains thirty-eight times to supply private pipes. Opened and back-filled two thousand three hundred forty-five and five-tenths feet of trenching, and furnished and laid one thousand six hundred nineteen and one-tenth feet of lead pipe of the following sizes, viz. :

$\frac{1}{2}$ inch.	$\frac{3}{8}$ inch.	$\frac{1}{2}$ inch.	1 inch.	1 $\frac{1}{4}$ inch.	Total.
240.1 feet.	1,082.9 feet.	189.9 feet.	26.1 feet.	80.1 feet.	1,619.1 feet.

And furnished and put on seventy-one three-fourths inch, five one inch, and four one and one-fourth inch solder nipples.

DRINKING TROUGHS.

During the year large bowls of the boiler pattern were set in the following locations to take the place of the small iron ones :

One at the junction of Douglas and Chalkstone avenues.

One on Parade street, opposite Willow street.

One at the corner of Waterman and East River streets, moved from Red Bridge.

And one at the junction of North Main and Benefit streets, in place of an old stone trough removed.

There are now twenty-six drinking troughs of the boiler pattern, eight stone drinking troughs, and six small iron drinking troughs, including one on Angell street, east of Brown street ; making the total number in use December 31, 1878, forty ; eleven of which are supplied with drinking cups.

DRINKING FOUNTAINS.

Drinking fountains have been attached to lamp posts at the corner of Pearl and West Clifford streets, and corner of Brook and Wickenden streets. The whole number of drinking fountains attached to lamp posts is fifteen.

The drinking fountain formerly located at the corner of Greenwich and Earl streets has been moved to the east side of Greenwich street, opposite Earl street.

The following table shows the material used, tapping the mains and running three feet of pipe for private supplies, connecting services to mains where private supplies were abandoned by the extension of mains, and for repairs on services :

SIZES, INCHES.	Repairs and Connecting Services to Mains.				Tapping and Pipe for Private Supplies.	
	Number of Taps.	Number of Stops.	Length of Tin-Lined Lead Pipe.	Length of Common Lead Pipe.	Number of Taps.	Length of Common Lead Pipe.
$\frac{3}{8}$	9	8	.....	.....	.....	.....
$\frac{1}{2}$	8	1	65.3	28.5	3	.....
$\frac{3}{4}$	6	2	5.	10.1	29	6.
$\frac{1}{2}$	.....	.....	1.5	19.8	4	72.
1	4	.....	9.9	.....	2	11.5
$1\frac{1}{2}$	.....	.....	.....	28.	.....	3.5

Three large and four small service boxes have been set to replace broken ones, nine used for elevator supplies, and forty-one set over taps for private supplies.

The above work is in charge of S. Horace Wheeler.

METER DEPARTMENT.

The following table shows the new meters set, those set on trial, and those taken out after being condemned as useless on account of various causes during the year :

MAKE.	NEW METERS SET.								SET ON TRIAL.								CONDEMNED AND TAKEN OUT.										
	SIZES IN INCHES.								Totals.	SIZES IN INCHES.								Totals.	SIZES IN INCHES.								Totals.
	¾	¾	1	1½	2	3	4	¾		¾	1	2	¾	¾	1	2	¾		¾	1	2	¾	¾	1	2	4	
Ball and Fitts, piston.....	355	77	7	430	
Ball and Fitts, rotary.....	2	6	2	1	2	13	8	8	2	18	
Fales, Jenks and Sons.....	8	19	1	.....	.....	.....	.....	28	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	28
Worthington.....	*1	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
Gem.....	.....	.....	.....	.....	.....	.....	.....	.....	2	.....	2	1	6	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Marland.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Totals.....	364	96	10	6	2	1	2	481	3	8	10	3	1	25	.....	.....	.....	.....	.....	2	28	2	1	1	34

* Second-hand, owned by the city.

In addition to the above the number of cases where meters were examined is twenty-five; where disconnected, tested and reset, five; where taken out, reset and changed for various purposes, sixty-five; where taken out for non-use, etc., twenty-eight; where Ball and Fitts meters were disconnected, repaired and reset, four hundred and fifty-one; where Fales, Jenks and Sons meters were taken out, repaired by the manufacturers and reset, five hundred and twenty-nine; and where Worthington meters were taken out, repaired by the department (except in a few cases, when castings, etc., were obtained from the manufacturer) and reset, is eighty-six. Forty-seven of the meters included in the above were disconnected in the latter part of the year 1877.

All meters, whether they are new or have been repaired, are tested before being set, and are rejected if there is an error in their register of more than two per cent.

A convenient room has been fitted up in the sub-basement of the City Hall for repairing meters, etc.

The above work is in charge of Edward A. Moran.

TABLE SHOWING THE RAIN-FALL AT SOCKANOSSET RESERVOIR DURING THE YEAR 1878.

Day of Month.	January.		February.		March.		April.		May.		June.		July.		August.		September.		October.		November.		December.	
	Fall.	.....	Fall.	.....	Fall.	.....	Fall.	.....	Fall.	.....	Fall.	.....	Fall.	.....	Fall.	.....	Fall.	.....	Fall.	.....	Fall.	.....	Fall.	.....
1	Ceased...	.90	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
2
3
490	.....	.....	.....	.55	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
5
6
7
8
932	.....	.....	.....	.....	.....	.....	.....	.45	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1040	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
11	1.06	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
12	Ceased...	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
13
14	1.02	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
Tot	5.58	.....	4.57	.....	4.29	.....	6.12	.....	2.68	.....	6.02	.....	3.24	.....	5.75	.....	1.68	.....	8.09	.....	9.47	.....	8.68

Total fall for the year was 65.15 inches. The approximate quantity of rain that fell into Sockanosset Reservoir during the year 1878 was 10,332,915 gallons.

TABLE SHOWING THE RAIN-FALL AT HOPE RESERVOIR DURING THE YEAR 1878.

Day of Month.	January.		February.		March.		April.		May.		June.		July.		August.		September.		October.		November.		December.	
	Fall.		Fall.		Fall.		Fall.		Fall.		Fall.		Fall.		Fall.		Fall.		Fall.		Fall.		Fall.	
1	Ceased...	1.00	.....	Comme'd.	..	.....	..	.....	..	.....	..	.....	..	.....	..	.....	..	.....	..	.....	..	.....	1.80
2	Ceased...	.60	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	..40
3	1.01	.....	.....	.....	Comme'd.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
4
5
6
7
8	Comme'd.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
9	Ceased...	.60	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
10	Comme'd.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
11	Comme'd.	1.12	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31	Comme'd.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Tot	3.53	.....	5.70	.....	3.86	.....	6.53	.....	2.41	.....	5.63	.....	2.78	.....	4.08	.....	1.51	.....	5.60	.....	9.96	.....	7.33	.....

Total fall for the year was 59.32 inches. The approximate quantity of rain that fell into Hope Reservoir during the year was 20,145,210 gallons.

The following table shows the temperature of both the water and atmosphere at one o'clock, P. M., at Hope and Sockanosset Reservoirs, each day during the year 1878:

Day of Month.	January.			February.			March.			April.			May.			June.		
	Hope Reservoir.		Sockanosset Reservoir.	Hope Reservoir.		Sockanosset Reservoir.	Hope Reservoir.		Sockanosset Reservoir.	Hope Reservoir.		Sockanosset Reservoir.	Hope Reservoir.		Sockanosset Reservoir.	Hope Reservoir.		Sockanosset Reservoir.
	Wat.	Atm's		Wat.	Atm's		Wat.	Atm's		Wat.	Atm's		Wat.	Atm's		Wat.	Atm's	
1	36	29	34	36	27	32	38	32	36	42	42	50	58	58	63	62	64	61
2	34	34	32	34	34	32	38	46	37	42	46	48	60	74	80	63	66	70
3	33	18	32	35	28	32	40	52	37	50	56	44	62	70	82	67	76	76
4	32	28	32	36	30	32	38	46	38	44	48	51	64	68	78	69	77	78
5	33	33	32	36	36	32	38	46	37	44	48	46	64	68	83	68	78	80
6	32	20	32	36	37	32	39	47	38	44	44	45	62	68	88	64	70	78
7	32	15	32	37	32	32	40	58	38	44	44	45	62	68	94	64	70	78
8	32	16	32	37	30	32	41	61	40	46	46	46	62	68	104	64	70	78
9	34	34	32	37	34	33	41	64	41	46	46	48	64	68	104	64	70	78
10	36	36	32	37	34	33	42	66	42	46	46	48	66	68	104	64	70	78
11	34	36	32	37	34	33	42	66	42	46	46	48	66	68	104	64	70	78
12	36	44	32	37	34	33	42	66	42	46	46	48	66	68	104	64	70	78
13	36	44	32	37	34	33	42	66	42	46	46	48	66	68	104	64	70	78
14	36	40	32	37	34	33	42	66	42	46	46	48	66	68	104	64	70	78
15	36	40	32	37	34	33	42	66	42	46	46	48	66	68	104	64	70	78
16	36	21	32	37	34	33	42	66	42	46	46	48	66	68	104	64	70	78
17	34	25	32	37	34	33	42	66	42	46	46	48	66	68	104	64	70	78
18	34	31	32	37	34	33	42	66	42	46	46	48	66	68	104	64	70	78
19	36	44	32	37	34	33	42	66	42	46	46	48	66	68	104	64	70	78
20	37	48	33	38	36	34	43	68	44	48	48	50	68	70	104	64	70	78
21	36	48	33	38	36	34	43	68	44	48	48	50	68	70	104	64	70	78
22	37	48	34	39	36	35	44	70	45	49	49	51	70	72	104	64	70	78
23	36	20	32	38	36	34	44	70	46	50	50	52	72	74	104	64	70	78
24	30	21	32	38	36	34	44	70	46	50	50	52	72	74	104	64	70	78
25	37	43	32	39	37	35	45	72	47	51	51	53	74	76	104	64	70	78
26	37	40	32	39	37	35	45	72	47	51	51	53	74	76	104	64	70	78
27	38	44	33	40	38	36	46	74	48	52	52	54	76	78	104	64	70	78
28	36	38	32	38	36	34	44	70	46	50	50	52	72	74	104	64	70	78
29	36	38	32	38	36	34	44	70	46	50	50	52	72	74	104	64	70	78
30	36	18	32	38	36	34	44	70	46	50	50	52	72	74	104	64	70	78
31	36	30	32	38	36	34	44	70	46	50	50	52	72	74	104	64	70	78

TABLE SHOWING TEMPERATURE OF WATER AND ATMOSPHERE, ETC.—CONTINUED.

Day of Month.	July.			August.			September.			October.			November.			December.		
	Hope Reservoir.		Sackanosset Reservoir.	Hope Reservoir.		Sackanosset Reservoir.	Hope Reservoir.		Sackanosset Reservoir.	Hope Reservoir.		Sackanosset Reservoir.	Hope Reservoir.		Sackanosset Reservoir.	Hope Reservoir.		Sackanosset Reservoir.
	Wat'r	Atm's		Wat'r	Atm's		Wat'r	Atm's		Wat'r	Atm's		Wat'r	Atm's		Wat'r	Atm's	
1	81	80	88	72	70	71	76	80	74	68	55	62	46	47	40	46	42	42
2	84	82	92	76	78	81	78	83	77	74	64	64	64	56	42	46	43	43
3	84	82	92	78	82	83	78	84	78	66	64	66	64	56	42	46	42	42
4	82	83	92	78	82	83	78	84	78	66	64	66	64	56	42	46	42	42
5	82	83	92	78	82	83	78	84	78	66	64	66	64	56	42	46	42	42
6	82	83	92	78	82	83	78	84	78	66	64	66	64	56	42	46	42	42
7	82	83	92	78	82	83	78	84	78	66	64	66	64	56	42	46	42	42
8	82	83	92	78	82	83	78	84	78	66	64	66	64	56	42	46	42	42
9	82	83	92	78	82	83	78	84	78	66	64	66	64	56	42	46	42	42
10	82	83	92	78	82	83	78	84	78	66	64	66	64	56	42	46	42	42
11	82	83	92	78	82	83	78	84	78	66	64	66	64	56	42	46	42	42
12	82	83	92	78	82	83	78	84	78	66	64	66	64	56	42	46	42	42
13	82	83	92	78	82	83	78	84	78	66	64	66	64	56	42	46	42	42
14	82	83	92	78	82	83	78	84	78	66	64	66	64	56	42	46	42	42
15	82	83	92	78	82	83	78	84	78	66	64	66	64	56	42	46	42	42
16	82	83	92	78	82	83	78	84	78	66	64	66	64	56	42	46	42	42
17	82	83	92	78	82	83	78	84	78	66	64	66	64	56	42	46	42	42
18	82	83	92	78	82	83	78	84	78	66	64	66	64	56	42	46	42	42
19	82	83	92	78	82	83	78	84	78	66	64	66	64	56	42	46	42	42
20	82	83	92	78	82	83	78	84	78	66	64	66	64	56	42	46	42	42
21	82	83	92	78	82	83	78	84	78	66	64	66	64	56	42	46	42	42
22	82	83	92	78	82	83	78	84	78	66	64	66	64	56	42	46	42	42
23	82	83	92	78	82	83	78	84	78	66	64	66	64	56	42	46	42	42
24	82	83	92	78	82	83	78	84	78	66	64	66	64	56	42	46	42	42
25	82	83	92	78	82	83	78	84	78	66	64	66	64	56	42	46	42	42
26	82	83	92	78	82	83	78	84	78	66	64	66	64	56	42	46	42	42
27	82	83	92	78	82	83	78	84	78	66	64	66	64	56	42	46	42	42
28	82	83	92	78	82	83	78	84	78	66	64	66	64	56	42	46	42	42
29	82	83	92	78	82	83	78	84	78	66	64	66	64	56	42	46	42	42
30	82	83	92	78	82	83	78	84	78	66	64	66	64	56	42	46	42	42
31	82	83	92	78	82	83	78	84	78	66	64	66	64	56	42	46	42	42

PREVAILING DIRECTION OF THE WIND AT HOPE RESERVOIR FROM MARCH TO DECEMBER, 1878, INCLUSIVE.

Day of Month	March		April		May		June		July		August		September		October		November		December	
	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.
1	.....	N. E.	N. E.	N. E.	S. W. to W.	N. W.	N. E.	N. E.	S. E.	S. S.	N. W.	N. W.	S.	W.	N. E.	N. E.	N. W.	N. W.	N. W.	N. E.
2	.....	N. N.	N. N.	N. N.	N. W.	N. W.	N. E.	N. E.	S. E.	S. S.	S. W.	S. W.	S.	S. to E.	N. E.	N. E.	N. W.	N. W.	N. W.	S. E.
3	.....	N. E.	N. E.	N. E.	S. S.	S. S.	N. E.	N. E.	N. W.	N. W.	S. W.	S. W.	S.	S. to E.	N. E.	N. E.	N. W.	N. W.	N. W.	S. W.
4	W.	N. W.	N. E.	N. E.	N. W.	N. W.	N. E.	N. E.	N. W.	N. W.	S. W.	S. W.	S.	N. E.	N. E.	N. E.	N. W.	N. W.	N. W.	N. W.
5	W.	S.	N. E.	N. E.	N. W.	N. W.	N. E.	N. E.	N. W.	N. W.	S. W.	S. W.	S.	N. E.	N. E.	N. E.	N. W.	N. W.	N. W.	N. W.
6	S.	S.	N. E.	N. E.	N. W.	N. W.	N. E.	N. E.	N. W.	N. W.	S. W.	S. W.	S.	N. E.	N. E.	N. E.	N. W.	N. W.	N. W.	N. W.
7	S.	S.	N. E.	N. E.	N. W.	N. W.	N. E.	N. E.	N. W.	N. W.	S. W.	S. W.	S.	N. E.	N. E.	N. E.	N. W.	N. W.	N. W.	N. W.
8	N. W.	N. E.	N. E.	N. E.	N. W.	N. W.	N. E.	N. E.	N. W.	N. W.	S. W.	S. W.	S.	N. E.	N. E.	N. E.	N. W.	N. W.	N. W.	N. W.
9	N. W.	N. E.	N. E.	N. E.	N. W.	N. W.	N. E.	N. E.	N. W.	N. W.	S. W.	S. W.	S.	N. E.	N. E.	N. E.	N. W.	N. W.	N. W.	N. W.
10	N. E.	N. E.	N. E.	N. E.	N. W.	N. W.	N. E.	N. E.	N. W.	N. W.	S. W.	S. W.	S.	N. E.	N. E.	N. E.	N. W.	N. W.	N. W.	N. W.
11	E.	E.	N. W.	N. W.	N. W.	N. W.	N. E.	N. E.	N. W.	N. W.	S. W.	S. W.	S.	N. E.	N. E.	N. E.	N. W.	N. W.	N. W.	N. W.
12	E.	E.	N. W.	N. W.	N. W.	N. W.	N. E.	N. E.	N. W.	N. W.	S. W.	S. W.	S.	N. E.	N. E.	N. E.	N. W.	N. W.	N. W.	N. W.
13	Variable.	Variable.	N. W.	N. W.	N. E.	N. E.	N. W.	N. E.	N. W.	N. W.	S. W.	S. W.	S.	N. E.	N. E.	N. E.	N. W.	N. W.	N. W.	N. W.
14	N. W.	N. W.	N. E.	N. E.	N. W.	N. W.	N. E.	N. E.	N. W.	N. W.	S. W.	S. W.	S.	N. E.	N. E.	N. E.	N. W.	N. W.	N. W.	N. W.
15	N. W.	N. W.	N. E.	N. E.	N. W.	N. W.	N. E.	N. E.	N. W.	N. W.	S. W.	S. W.	S.	N. E.	N. E.	N. E.	N. W.	N. W.	N. W.	N. W.
16	N. W.	N. E.	N. E.	N. E.	N. W.	N. W.	N. E.	N. E.	N. W.	N. W.	S. W.	S. W.	S.	N. E.	N. E.	N. E.	N. W.	N. W.	N. W.	N. W.
17	N. E.	N. E.	N. W.	N. W.	N. W.	N. W.	N. E.	N. E.	N. W.	N. W.	S. W.	S. W.	S.	N. E.	N. E.	N. E.	N. W.	N. W.	N. W.	N. W.
18	N. W.	N. E.	N. E.	N. E.	N. W.	N. W.	N. E.	N. E.	N. W.	N. W.	S. W.	S. W.	S.	N. E.	N. E.	N. E.	N. W.	N. W.	N. W.	N. W.
19	N. W.	N. W.	N. E.	N. E.	N. W.	N. W.	N. E.	N. E.	N. W.	N. W.	S. W.	S. W.	S.	N. E.	N. E.	N. E.	N. W.	N. W.	N. W.	N. W.
20	N. W.	N. W.	N. E.	N. E.	N. W.	N. W.	N. E.	N. E.	N. W.	N. W.	S. W.	S. W.	S.	N. E.	N. E.	N. E.	N. W.	N. W.	N. W.	N. W.
21	N. W.	N. W.	N. E.	N. E.	N. W.	N. W.	N. E.	N. E.	N. W.	N. W.	S. W.	S. W.	S.	N. E.	N. E.	N. E.	N. W.	N. W.	N. W.	N. W.
22	N. W.	N. W.	N. E.	N. E.	N. W.	N. W.	N. E.	N. E.	N. W.	N. W.	S. W.	S. W.	S.	N. E.	N. E.	N. E.	N. W.	N. W.	N. W.	N. W.
23	N. W.	N. W.	N. E.	N. E.	N. W.	N. W.	N. E.	N. E.	N. W.	N. W.	S. W.	S. W.	S.	N. E.	N. E.	N. E.	N. W.	N. W.	N. W.	N. W.
24	N. W.	N. W.	N. E.	N. E.	N. W.	N. W.	N. E.	N. E.	N. W.	N. W.	S. W.	S. W.	S.	N. E.	N. E.	N. E.	N. W.	N. W.	N. W.	N. W.
25	N. W.	N. W.	N. E.	N. E.	N. W.	N. W.	N. E.	N. E.	N. W.	N. W.	S. W.	S. W.	S.	N. E.	N. E.	N. E.	N. W.	N. W.	N. W.	N. W.
26	N. W.	N. W.	N. E.	N. E.	N. W.	N. W.	N. E.	N. E.	N. W.	N. W.	S. W.	S. W.	S.	N. E.	N. E.	N. E.	N. W.	N. W.	N. W.	N. W.
27	N. W.	N. W.	N. E.	N. E.	N. W.	N. W.	N. E.	N. E.	N. W.	N. W.	S. W.	S. W.	S.	N. E.	N. E.	N. E.	N. W.	N. W.	N. W.	N. W.
28	N. W.	N. W.	N. E.	N. E.	N. W.	N. W.	N. E.	N. E.	N. W.	N. W.	S. W.	S. W.	S.	N. E.	N. E.	N. E.	N. W.	N. W.	N. W.	N. W.
29	N. E.	N. E.	N. W.	N. W.	N. W.	N. W.	N. E.	N. E.	N. W.	N. W.	S. W.	S. W.	S.	N. E.	N. E.	N. E.	N. W.	N. W.	N. W.	N. W.
30	N. E.	N. E.	N. W.	N. W.	N. W.	N. W.	N. E.	N. E.	N. W.	N. W.	S. W.	S. W.	S.	N. E.	N. E.	N. E.	N. W.	N. W.	N. W.	N. W.
31	N. E.	N. E.	N. W.	N. W.	N. W.	N. W.	N. E.	N. E.	N. W.	N. W.	S. W.	S. W.	S.	N. E.	N. E.	N. E.	N. W.	N. W.	N. W.	N. W.

The following table shows the average, maximum and minimum elevations of the Pawtuxet River at Pettaconset during the year :

MONTHS.	AVERAGE ELEVATIONS.				MAXIMUM ELEVATIONS.			MINIMUM ELEVATIONS.		
	MONTHLY.				Date.	Time.	Elevat'n.	Date.	Time.	Elevat'n.
	7 A.M.	12 M.	6 P.M.	Daily.						
January.....	10.16	10.54	10.36	10.35	12	7 A. M.	14.97	9	7 A. M.	8.30
February.....	10.23	10.61	10.37	10.40	23	11 to 12 M.	19.20	17	6 P. M.	8.90
March.....	10.34	10.68	10.39	10.47	14	12 M.	13.16	31	6 P. M.	9.08
April.....	9.50	9.87	9.69	9.69	30	12 M.	14.10	22	7 A. M.	8.80
May.....	9.29	9.74	9.53	9.52	1	12 M.	13.20	29	7 A. M.	8.53
June.....	9.05	9.55	9.39	9.33	1	12 M.	10.80	30	7 A. M.	8.50
July.....	8.34	9.07	9.00	8.80	2	12 M.	9.42	21	6 P. M.	8.04
August.....	8.36	9.10	9.03	8.83	7	12 M.	9.86	25	12 M.	8.14
September.....	8.23	8.92	8.89	8.68	5	12 M.	9.34	30	7 A. M.	7.98
October.....	8.38	9.06	9.03	8.82	24	12 M.	10.84	6	6 P. M.	7.97
November.....	9.08	9.70	9.70	9.40	23	5.30 P. M.	12.70	14	7 A. M.	8.03
December.....	10.57	10.91	10.72	10.73	11	5.30 P. M.	17.70	29	5 P. M.	9.18
For the year	9.29	9.81	9.67	9.59	Feb. 23	11 to 12 M.	19.20	Oct. 6	6 P. M.	7.97

The monthly and annual and the average daily and monthly consumption of water, including waste and leakage, during the year 1878, is shown by the following table :

MONTHS.	Consumption per Month.	Average Monthly Consumption.	Average Daily Consumption per Month.	Average Daily Consumption for the Year.
January.....	66,861,078	.....	2,156,809	.....
February.....	60,128,961	.....	2,147,468	.....
March.....	68,285,415	.....	2,202,755	.....
April.....	69,775,957	.....	2,325,865	.....
May.....	88,481,274	.....	2,854,235	.....
June.....	86,736,146	.....	2,891,205	.....
July.....	120,165,526	.....	3,876,807	.....
August.....	96,684,893	.....	3,118,868	.....
September.....	95,152,663	.....	3,171,755	.....
October.....	88,222,559	.....	2,845,889	.....
November.....	71,784,663	.....	2,392,822	.....
December.....	73,733,485	.....	2,378,500	.....
Total.....	986,012,620	82,167,718	.....	2,701,404

Schedule of Water Works material received and delivered during the year 1878, also the balance on hand January 1, 1879 :

Received during the year, together with quantity on hand January 1st, 1878.					Received during the year, together with quantity on hand January 1st, 1878.				
KIND.	Sizes. Inches.	Pieces.	Delivered. Pieces.	Balance on hand Jan. 1, 1879 Pieces.	KIND.	Sizes. Inches.	Pieces.	Delivered. Pieces.	Balance on hand Jan. 1, 1879 Pieces.
Straight pipe. .B...	36	1	0	1	Branch pipe.....	8x6	23	13	10
" " "A...	36	4	1	3	" " "8x8x8	8x8x8	3	0	3
" " "a2...	36	4	0	4	" " "8x8x6	8x8x6	1	0	1
" " "B...	30	6	1	5	" " "8x6x6	8x6x6	8	0	8
" " "b2...	30	4	0	4	" " "8x4	8x4	2	0	2
" " "B...	24	42	0	42	" " "6x8	6x8	59	27	32
" " "A...	24	23	6	17	" " "6x6	6x6	63	19	44
" " "B...	20	37	20	17	" " "6x8x6	6x8x6	4	0	4
" " "B...	16	415	126	289	" " "6x6x6	6x6x6	16	12	4
" " "B...	12	586	189	397	" " "6x4	6x4	16	7	9
" " "A...	12	453	6	448	Y branched pipe..	6x6	4	0	4
" " "B...	10	24	1	23	Flanged branched				
" " "B...	8	313	202	21	pipe.....	4x4	5	0	5
" " "A...	8	515	142	373	Blow-off branches	30	1	0	1
" " "B...	6	3,411	1,558	1,853	" " "24	24	1	0	1
" " "A...	4	83	83	0	Man-hole pipe....	36	1	0	1
Branch pipe.....	30x30	1	0	1	" " "30	30	1	0	1
" " "30x24	30x24	1	0	1	" " "24	24	1	0	1
" " "30x20	30x20	1	0	1	Curve pipe.....	30	7	0	7
" " "30x16	30x16	1	0	1	" " "24	24	6	0	6
" " "30x12	30x12	1	0	1	" " "16	16	4	2	2
" " "30x10	30x10	1	0	1	Blow-off bends....	8	3	1	2
" " "30x8	30x8	1	0	1	Quarter turns....	12	4	4	0
" " "30x6	30x6	2	0	2	" " "8	8	15	9	6
" " "30x24x12	30x24x12	1	0	1	" " "6	6	26	22	4
" " "30x12x8	30x12x8	1	0	1	" " "4	4	13	13	0
" " "30x8x8	30x8x8	1	0	1	Eighth turns....	12	11	8	3
" " "30x8x6	30x8x6	1	0	1	" " "10	10	4	1	3
" " "24x24	24x24	1	0	1	" " "8	8	11	5	6
" " "24x16	24x16	1	0	1	" " "6	6	35	21	14
" " "24x12	24x12	1	0	1	Sixteenth turns...	10	6	2	4
" " "24x10	24x10	1	0	1	" " "8	8	7	5	2
" " "24x8	24x8	1	0	1	" " "6	6	46	36	8
" " "24x6	24x6	1	0	1	Reducers.....	30 to 24	1	0	1
" " "24x8x8	24x8x8	1	0	1	" " "24 to 12	24 to 12	1	0	1
" " "24x6x6	24x6x6	1	0	1	" " "20 to 16	20 to 16	1	0	1
" " "20x16	20x16	1	0	1	" " "16 to 12	16 to 12	2	1	1
" " "20x12	20x12	1	0	1	" " "12 to 8	12 to 8	4	0	4
" " "20x10	20x10	1	0	1	" " "10 to 8	10 to 8	1	0	1
" " "20x8	20x8	1	0	1	" " "8 to 6	8 to 6	5	1	4
" " "20x6	20x6	1	0	1	" " "6 to 5	6 to 5	7	0	7
" " "20x10x8	20x10x8	1	0	1	" " "6 to 4	6 to 4	13	5	8
" " "20x8x6	20x8x6	1	0	1	Sleeves.....	36	1	0	1
" " "20x6x6	20x6x6	1	0	1	" " "30	30	29	1	28
" " "16x16	16x16	1	0	1	" " "24	24	12	0	12
" " "16x12	16x12	1	0	1	" " "20	20	3	1	2
" " "16x10	16x10	2	1	1	" " "16	16	4	3	1
" " "16x8x8	16x8x8	1	0	1	" " "12	12	19	6	13
" " "16x6x6	16x6x6	1	0	1	" " "10	10	3	1	2
" " "16x12x12	16x12x12	1	0	1	" " "8	8	18	8	10
" " "16x8x6	16x8x6	1	0	1	" " "6	6	27	8	19
" " "16x8	16x8	20	7	13	" " "4	4	3	2	1
" " "16x6	16x6	35	7	28	Collars.....	30	3	0	3
" " "12x12	12x12	5	1	4	" " "24	24	4	0	4
" " "12x10	12x10	1	0	1	" " "8	8	9	0	9
" " "12x8	12x8	17	7	10	" " "6	6	22	0	22
" " "12x6	12x6	10	2	14	Bevel hubs....	12	11	1	10
" " "12x6x6	12x6x6	4	1	3	" " "10	10	3	0	3
" " "12x8x8	12x8x8	2	0	2	" " "8	8	20	8	12
" " "12x8x6	12x8x6	1	1	0	" " "6	6	18	8	10
" " "10x8	10x8	5	0	5	Gates.....	16	6	2	5
" " "10x6	10x6	4	0	4	" " "12	12	10	4	6
" " "10x8x6	10x8x6	1	0	1	" " "10	10	1	1	0
" " "10x8x8	10x8x8	2	0	2	" " "8	8	20	13	7
" " "10x6x6	10x6x6	1	0	1	" " "6	6	102	53	49
" " "8x8	8x8	19	16	3	" " "4	4	13	9	4

<i>Received during the year, together with quantity on hand January 1st, 1878.</i>			<i>Deliver'd.</i>		<i>Received during the year, together with quantity on hand January 1st, 1878.</i>			<i>Deliver'd.</i>	
KIND.	Sizes. Inches.	Pieces.	Pieces.	Balance on hand Jan. 1, '79	KIND.	Sizes. Inches.	Pieces.	Pieces.	Balance on hand Jan. 1, '78
Gates.....	2½	8	3	5	Spigot caps.....	6	22	15	7
Gate boxes, round.....	13½	123	1	5	Plug caps.....	12	9	2	7
“ oblique.....	6	1	5	5	“ “.....	8	35	24	11
Gate box frames.....	15½	70	82	“ “.....	6	73	67	6	6
“ covers.....	15½	67	85	“ “.....	4	12	11	1	1
Hydrants.....	6½	32	37	“ “.....	30	3	0	3	3
Hydrant boxes.....	6½	36	33	“ “.....	24	7	0	7	7
Hydrant box covers.....	7½	33	41	“ “.....	20	3	0	3	3
Spigot caps.....	16	5	2	3	“ “.....	16	6	0	6
“ “.....	12	5	1	4	“ “.....	12	5	0	5
“ “.....	10	1	0	1	“ “.....	10	4	0	4
“ “.....	8	10	3	7	“ “.....	8	23	2	20
					“ “.....	6	121	2	119

Miscellaneous stock on hand January 1, 1879 :

- 60 small covers for hydrant boxes.
- 28 hydrant valves, nuts and rods.
- 3 fixtures for street sprinklers.
- 9 air cocks for mains.
- 3 screws for 36 inch gates.
- 17 air cocks for gates.
- 1 24-inch bonnet, valve and screw.
- 1 10-inch “ “ “ “
- 1 8-inch “ “ “ “
- 9 6-inch “ “ “ “
- 4 6-inch “ and screws.
- 2 6-inch “
- 2 4-inch relief valves.
- 8 stuffing boxes for water-gates.
- 20 feet of 30-inch pipe, pieces.
- 27 “ “ 24-inch “ “
- 27 “ “ 20-inch “ “
- 80 “ “ 16-inch “ “
- 35 “ “ 12-inch “ “
- 54 “ “ 10-inch “ “
- 160 “ “ 8-inch “ “
- 100 “ “ 6-inch “ “
- 5 tons of scrap iron.
- 20,604 Danversport brick.
- 1,300 3-inch drain tile.
- 2,490 4 inch “ “
- 6 patent sprinkler connections.
- 27 ½-inch brass plugs.

8,370 pounds of pig lead.
195 " " yarn.
 $\frac{1}{4}$ chaldron of coke.

Schedule of materials for drinking troughs and fountains,
and service pipe work, on hand January 1, 1879 :

FOR DRINKING FOUNTAINS.

5 galvanized cups with chains.
7 new cups (Gorham Manufacturing Co.'s.)
20 feet of chain, with extra links, rings, etc.
11 Zane's self-closing faucets.
1 Peck's self-closing faucet.
10 signs — "Please keep the cups out of bowls."

FOR SMALL DRINKING TROUGHS.

1 set of patterns for drinking trough inlets.
10 cast-iron stands for small troughs.
4 short standards " " "
1 bowl for small troughs.

FOR LARGE DRINKING TROUGHS.

5 boiler bottoms.
1 bowl.
6 lamp posts.
1 stone trough, with lamp post.

FOR PAINTING.

18 lbs. metallic paint.
19 " Hampden green paint.
3 paint brushes.
1 paint duster.
2 paint cans.
1 1-gallon oil can.
1 $\frac{1}{2}$ -gallon "

FOR SERVICE PIPE WORK.

1 set of patterns and bore boxes, complete, for $\frac{1}{2}$ -inch taps and stops
and 1-inch taps and stops.
177 small and 77 large service boxes.
14 lbs. of brass tubing.
255 $\frac{1}{2}$ pounds of solder.

SIZES.	TAPS.	STOPS.	PLUGS.	TIN-LINED LEAD PIPE.	COMMON LEAD PIPE.
Inches.	Number.	Number.	Number.	Pounds.	Pounds.
$\frac{3}{8}$	2,778	2,826	26	.....	124.
$\frac{1}{2}$	278	165	28	395.	1,829.
$\frac{3}{4}$	27	78	8	305.	6,688.5
$\frac{1}{1}$	40	88	10	563.	5,404.5
1	7	24	12	.....	2,462.5
$1\frac{1}{2}$	.....	.....	.....	376.	2,020.
$1\frac{3}{4}$	.....	.....	.....	.....	294.
Totals.	8,180	8,181	84	1,639.	18,822.5

MISCELLANEOUS STOCK.

- 1 iron mould for rubber packings for tapping machines.
- 13 hydrant heads.
- About 18 baskets of charcoal.
- 2 lbs tarred marline.
- 1 lamp post clamp.
- 454 lbs. of scrap lead.
- 4 lbs. of tin.
- 179 lbs. of pig lead filings.

Schedule of meters and material for setting and repairing meters, on hand January 1, 1879:

METERS OF THE FOLLOWING MAKES AND SIZES.

	$\frac{1}{2}$ inch.	$\frac{3}{4}$ inch.	1 inch.	2 inch.
Ball and Fitts, piston.....	16	8	2	....
Worthington.....	1	....	....	....
Fales, Jenks and Sons.....	....	....	....	4

FITTINGS, ETC., FOR BALL AND FITTS' METERS.

- 15 $\frac{1}{2}$ -inch connections.
- 10 $\frac{3}{4}$ -inch "
- 6 1-inch "
- 4 $1\frac{1}{2}$ -inch "
- 4 2-inch "
- 2 3-inch " with flanges.
- 2 4-inch " " "
- 33 piston "

55 $\frac{3}{4}$ -inch heads and linings.
 24 $\frac{3}{4}$ -inch " " "
 40 $\frac{3}{4}$ -inch packings.
 36 $\frac{3}{4}$ -inch "
 17 1-inch "
 152 clock gears.
 58 spindle gears.
 124 brass nuts.

FITTINGS, ETC., FOR FALES, JENKS AND SONS' METERS

14 $\frac{3}{4}$ -inch connections.
 20 $\frac{3}{4}$ -inch . "
 5 1-inch "
 53 1-inch couplings.
 6 $1\frac{1}{2}$ -inch "
 4 2-inch "
 50 couplings and nuts.
 6 1-inch nuts.
 48 clamps.

MISCELLANEOUS STOCK.

10 feet of lead pipe.
 10 " " $\frac{1}{2}$ -inch iron pipe.
 5 " " $\frac{3}{4}$ -inch " "
 10 " " $\frac{3}{4}$ -inch brass pipe.
 125 iron nipples.
 35 brass washers.
 28 meter couplings.
 18 $\frac{3}{4}$ -inch x $\frac{1}{2}$ -inch galvanized elbows.
 9 " " " couplings.
 1 2-inch brass connection.
 75 iron bolts and nuts.
 24 meter screws.
 300 old iron fittings.
 19 " " unions.
 13 " brass "
 180 lbs. of solder.
 10 " rubber packing.
 25 packings for stuffing boxes.
 30 lbs. cop waste.
 3 meter dials.
 $\frac{1}{2}$ lb. copper wire.
 1,400 lbs of iron (old.)
 20 " " scrap brass.
 150 " " " lead.
 20 " " " iron.

Following is a statement of the additional amount of material required for the extension of water pipes for the year ending December 31, 1879, based upon the quantity used during the year 1878 :

KIND.	Size in Inches.	Number of Pieces.	WEIGHT.		
			Pounds.	Tons.	Total Tons.
Pipe, Class A.....	4	100	9.11	174.98
" " B.....	8	800	.....	79.02
" " B.....	10	252	.....	86.85
Branches	10x8	4	1,380		
"	6x6x6	6	1,476		
"	8x6x6	5	1,325		8.95
"	8x6	6	1,464		
"	8x8	15	4,350		
Eighth turns.....	6	10	920		
"	8	4	900		
Sixteenth turns....	6	40	3,600		
"	8	6	1,320		
Quarter turns.....	4	10	680		
Reducer	12 to 10	1	193		
Caps.....	6	100	1,820		
"	8	20	614		
Gates	6	20		
"	8	10	.....	
"	10	4	.....	
"	4	10	.....	

The following material will be required for Service Pipe Work for the year 1879 :

About twenty-five tons of lead pipe of the various sizes.

Seven hundred service boxes (small size.)

Four bowls for large drinking troughs.

Four hundred and fifty $\frac{1}{2}$ -inch taps, and five hundred and fifty $\frac{1}{4}$ -inch stops.

One hundred and fifty $\frac{1}{8}$ -inch taps, and one hundred $\frac{1}{4}$ -inch stops.

Twenty 1-inch taps.

Following is an estimate of the quantity of material that will be required for setting and repairing meters :

METERS OF THE FOLLOWING SIZES.

$\frac{1}{8}$ inch.	$\frac{3}{8}$ inch.	1 inch.	$1\frac{1}{2}$ inch.	2 inch.	3 inch.	4 inch.
353	77	9	6	2	1	2

Sundry small iron fittings, lead pipe, solder, new heads and other parts of Union Meters for repairs, meter packings, candles, sealing-wax, oil paint, etc.

SEWERS.

∞ The following table shows the locations, sizes and lengths of sewers constructed during the year 1878 :

STREET.	ORDERED.		DATE OF COMPLETION	4 INCH BRICK WORK.					PIPE.		Totals.
	Res. No.	DATE.		Oval Brick.		Circular Brick.			15 inch.	12 inch.	
				22x33 inch.	18x26 inch.	24 inch.	22 inch.	20 inch.			
West River and Whelden streets, from summit in West River street to Moshassuck river	469	Oct. 14, 1878.	Dec. 7, 1878.	70.70	.....	.....	132.83	371.72	222.05	515.68	1,312.98
Park street, from Smith street to the Woonasquatucket river	317	June 21, 1878.	Sept. 17.....	.....	142.00	.....	.....	.....	860.00	501.50	1,503.50
Jenkins and North Main sts. from Camp to Livingston st.	425	Sept. 12, 1878.	Not completed	.....	.....	483.50	.....	.....	642.40	698.00	1,733.90
India street, from Ann to Brook street.....	405	Sept. 6, 1877.	Sept. 27.....	.....	.....	.....	.....	.....	38.66	319.90	388.55
India street, from Ives to Gano street.....	349	June 11, 1877.	April 12.....	.....	.....	.....	.....	.....	.....	419.48	419.48
Ann street, from Front to India street.....	405	Sept. 6, 1877.	Sept. 27.....	.....	.....	.....	.....	.....	.....	215.83	215.83
First street north of India street, from Ann to Brook street	405	Sept. 6, 1877.	Sept. 27.....	.....	.....	.....	.....	.....	.....	365.74	365.74
First street north of India street, from Traverses to Brook st.	404	Sept. 6, 1877.	Sept. 27.....	.....	.....	.....	.....	.....	.....	231.53	231.53
Bridgham street, from High to Cranston street.....	604	Oct. 11, 1877.	May 8.....	.....	.....	.....	.....	.....	.....	1,012.57	1,012.57
Olney street, from East avenue to Camp street.....	186	April 11, 1878.	July 21.....	.....	.....	.....	.....	.....	.....	734.62	734.62
Pitman street, from Governor to Ives street.....	220	May 1, 1878.	May 21.....	.....	.....	.....	.....	.....	.....	438.12	438.12
Power street, from Hope to Brook street.....	195	April 15, 1878.	July 13.....	.....	.....	.....	.....	.....	.....	251.76	251.76
Governor street, from Manning to George street.....	226	May 6, 1878.	Aug. 1.....	.....	.....	.....	.....	.....	.....	444.10	444.10
Hedley and Palmer streets, from Pettis to Walling street....	248	May 20, 1878.	Sept. 20.....	.....	.....	.....	.....	.....	.....	700.90	700.90
Trenton street, from Governor to Ives street.....	266	May 31, 1878.	Aug. 10.....	.....	.....	.....	.....	.....	.....	461.50	461.50
Greenwich st., from Parkis avenue to West Friendship st.	301	June 21, 1878.	Aug. 15.....	.....	.....	.....	.....	.....	.....	330.12	330.12
Spring street, from High School building to Broad street....	388	Aug. 24, 1878.	Sept. 7.....	.....	.....	.....	.....	.....	.....	236.30	236.30
Total length, in feet.....				70.70	142.00	483.50	132.83	371.72	1,763.10	7,787.95	10,751.80
Total length, in miles.....											2.036

One hundred and ten manholes and four lampholes were built in connection with the above work ; making the number of manholes twenty-three hundred and fourteen, and the number of lampholes one hundred and sixty, to January 1st, 1879.

Sewers, in State and Orms streets, from a point one hundred feet north of Field street to the present sewer in Orms street, ordered April 11, 1878, and in Maple and Plain streets, from Beacop street to the sewer in South street, ordered December 30, 1878, had not been commenced January 1st, 1879. The sewer in Maple street was not begun on account of the lateness of the season when ordered. State and Orms street sewer was delayed on account of questions involved in connection with Orms street bridge, as to its condition and the relation of the city and railroad corporation to the same.

Forty-eight catch-basins were built and connected with the sewers constructed during the year.

Twenty-eight catch-basins were built to relieve streets of surface water in the following places :

- 1 on Dyer street, opposite Daniel E. Day's estate.
- 1 at north-east corner of Wheaton and South Court streets.
- 1 at south corner of Sabin street and Broadway.
- 1 at east " " " " " "
- 5 on Washington and Aborn streets, storm sewer.
- 2 on Greenwich street at Daboll street.
- 1 on Dorrance street, corner Exchange place.
- 3 on Exchange place, south side, between Dorrance street and the river.
- 2 on north side of Cove street, between the Depot and Fountain street.
- 2 on Exchange place, near the Monument.
- 2 at corners (N. W. and S. W.) of Eddy and Fulton streets.
- 1 on West Exchange street, at Aborn street.
- 1 on Angell street, north side, east of Benefit street.
- 1 on Cove street, opposite Fountain street ; and
- 4 basins and 4 extra inlets under sidewalks around the City Hall.

Thirty-two catch-basins were built at the following places to trap old drains :

- 2 on Randall street, at Printery street.
- 1 on North Main street, east side, opposite No. 641.
- 1 " " " " " " 32 feet south of Doyle avenue.
- 7 on Bacon street, between North Main and Camp streets.
- 1 on Camp street, north-west corner of Bacon street.
- 1 " " " north-east " " " "
- 1 on Howell street, north-east corner of Camp streets.
- 1 " " " south-east " " " "
- 1 on Canal street, corner Amos street.
- 1 " " " " Linard street.
- 1 " " " " Throop avenue.
- 8 on Sabln street, between Aborn and Cove streets.
- 2 at the corners of South Court and Wheaton streets.
- 3 on Benefit street, at Bowen street; and
- 1 basin and an extra inlet on Fountain street, east of Aborn street.

The total number of catch-basins built during the year was one hundred and eight ; and the whole number built to January 1st, 1879, is one thousand seven hundred and three.

Three hundred and eight private connections were made with the sewers during the year, making the total number two thousand five hundred and sixty-six.

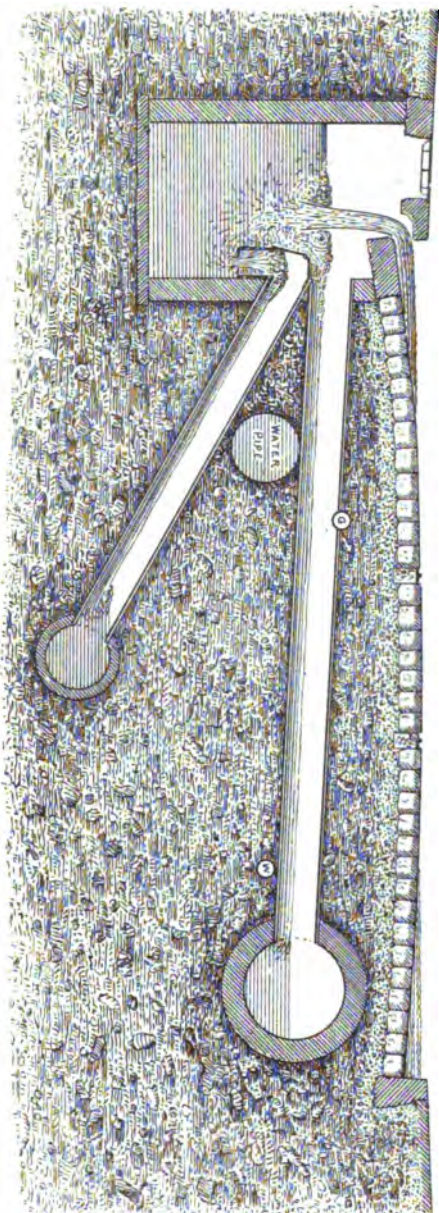
Following is a schedule of the total lengths of each size and the total length of sewer constructed to January 1st, 1879 :

SIZE.	KIND.	Constructed previous to 1878.	Constructed in 1878.	Totals.
66x72.....	Brick ..	530.64	.....	530.64
40x60.....	" ..	2,354.46	.....	2,354.46
38x57.....	" ..	2,891.15	.....	2,891.15
36x54.....	" ..	3,095.33	.....	3,095.33
34x51.....	" ..	594.50	.....	594.50
32x48.....	" ..	410.85	.....	410.85
30x45.....	" ..	2,916.13	.....	2,916.13
28x42.....	" ..	3,789.78	.....	3,789.78
26x39.....	" ..	1,602.15	.....	1,602.15
24x36.....	" ..	4,719.15	.....	4,719.15
22x33.....	" ..	4,969.31	70.70	5,040.01
20x30.....	" ..	6,244.76	.....	6,244.76
18x16.....	" ..	.....	142.00	142.00
16x24.....	" ..	482.00	.....	482.00
66.....	" ..	4,025.55	.....	4,025.55
54.....	" ..	250.00	.....	250.00
48.....	" ..	1,707.72	.....	1,707.72
40.....	" ..	568.25	.....	568.25
36.....	" ..	195.80	.....	195.80
30.....	" ..	349.17	.....	349.17
24.....	" ..	1,445.50	483.50	1,929.00
22.....	" ..	7,491.61	132.83	7,624.44
20.....	" ..	9,307.55	371.72	9,679.27
18.....	" ..	10,587.92	.....	10,587.92
16.....	" ..	4,059.06	.....	4,059.06
18.....	Pipe ..	1,128.26	.....	1,128.26
15.....	" ..	18,077.05	1,763.10	19,840.15
12.....	" ..	120,503.75	7,787.95	128,291.70
8.....	" ..	*219.30	.....	219.30
Total length in feet.....		214,516.70	10,751.80	225,268.50
Total length in miles.....		40 62	2.036	42.656

*Laid in 1873.

A storm sewer has been constructed in Washington and Aborn streets to relieve the Washington street sewer district of overflows, by commencing at the junction of Broadway and Aborn street and running through Aborn street to Washington street, there joining the sewer which commences at Walker street, on Washington street, and running through Washington street across Cove street and the Cove promenade to the Cove basin, the water line of the outlet being one foot below mean high water. This sewer is located on the west side of Aborn street and on the north side of Washington street, just outside the curb line and as near the surface

Cross-section of Washington Street showing Storm Sewer, Regular Sewer and Catch-basin, with method of throttling and connecting.
Scale=0.015 ft. to one ft.



of the street as the connections from basins on the other side of the street would permit. The catch-basins in this district have been throttled, (as will be seen by the accompanying sketch,) to admit into the regular sewer only the amount of water which it is calculated to carry, and connected with the storm sewer wherever possible. Twenty-three basins were throttled and eight new ones built and connected directly with this sewer.

By allowing the main sewer to take only the quantity of storm water that it can safely carry, without head, we remove one fruitful cause of overflow and thus lessen the probability of its recurrence. The unfortunate conditions attending the lower part of this district, in its relation to tide-water, have not been removed, and the effect of flood tides will still continue to be felt. It is reasonable to expect that part of the district in which the sewer is above high tides, will be much relieved from future trouble. This storm sewer from Dorance street to the Cove basin is of sufficient size to admit much surface water from Cove street and vicinity, in addition to the water brought to it from Washington street.

I would also say, in this connection, that on account of changes in grade of Washington street near the City Hall, made necessary on account of the same, it was thought best to extend the change as far as Union street, in order to get rid of a dip or basin in the grade, opposite the Aldrich House, so that the grade as now established gives a continuous down grade in Washington street, from above Union street to Exchange place, where, it is thought, ample provision has been made to take care of any water that may, at any time, find its way down Washington street on the surface.

The following table shows the lengths and sizes of each kind of work in the storm sewer :

CIRCULAR BRICK SEWER.							TOTAL LENGTH.
8 INCH WORK.				4 INCH ARCH.	4 INCH WORK.		
48 inch.	36 inch.	34 inch.	28 inch.	26 inch.	24 inch.	22 inch.	
Feet.	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.
202.10	93.00	448.57	761.67	228.87	71.50	157.56	1,963.27

In addition to the storm sewer provision has been made to take away a large amount of the surface overflow from the district above Washington street district by re-connecting the old stone drain in Sabin street.

This old drain formerly commenced near the junction of Federal and Sabin streets, and ran through Sabin street, across Cove street and the Cove promenade, and emptied into the Cove basin. It was cut off in constructing the new sewers in Broadway, Atwell's avenue, and Aborn street.

The catch-basins, corner Atwell's avenue and Sabin street and on the corners of Broadway, have been throttled and connected with this drain, two old openings on Broadway, above Sabin street, that had been closed, were re-opened and re-connected and two new basins were built and connected directly with this drain. As a relief to the Cove street sewer at Sabin street, an overflow has been made from the upper part of the Cove street sewer into the outlet of the old Sabin street drain, leading into the Cove basin.

MAINTENANCE.

Following is a statement showing the work cleaning and repairing sewers and basins during the year :

		Number Cleaned.	Length Cleaned.	Deposit Remov'd	Total Deposit Remov'd	Number Filled.	
			Miles.	Cubic Yards.	Cubic Yards.	From Hydr'nts	By Rain.
New sew- ers.....	} Catch basins	6,257	.....	4,395		5,321	981
		Sewers. ..	84	6 1-3	47	4,442	
Old sewers	Sand catchers	39	.....	327			
	Drains. ..	4	1-6	44			
	Basins....	17	.....	22	393		
Totals.....		.....	6 1-2	.....	4,835	5,321	981

The sewer in Atwell's avenue was cleaned nine times and twenty-eight cubic yards of deposit taken therefrom; one hundred and ninety-two cubic yards of deposit from old drains was removed from Peck street dock; nine catch-basins have been altered to conform to change in curb lines; new timbers were placed on James street and Long Pond catchers, rotten timbers on four catchers on South Water street replaced with new, the timbers on all old catchers cleaned and tarred and new covering stone placed over catcher on South Water street at Ward street; one basin, two half-basins and one manhole were built, two manhole frames and two lantern holes raised to the surface of the street, two basin connections repaired, two basins displaced by frost re-built, and one basin removed for non-use. Eighty-seven manhole covers, that were worn smooth, have been replaced with new.

Twenty-nine house connections have been cleaned, nine boilers and twenty cisterns filled, water pumped from Roger Williams square, mud and brush removed from the edge of the Cove basin, and snow removed from sidewalks around Hope Reservoir, during the season.

All work done for different departments and for private parties, by this department, has been paid for by them respectively.

August 6th, owing to a violent rain storm, a break occurred in the Plain and Blackstone street sewer, in Plain street, between Pearl and Blackstone streets. The street at this point is built on an embankment, the filling being some twenty feet deep, and a stone culvert connects the valley above and below. From this culvert northerly eighty-five feet the street was probably first washed away, uncovering a portion of the sewer, which burst, and one-half of the arch on the down stream side was carried away for a distance of forty-two feet. This portion, with six feet more that was taken up on account of cracks, was re-built with twelve inch work toothed into and carried over the old part, and the whole strengthened by rings of brickwork, 8 x 16 inch, ten feet apart; these rings start from piers, the foundations of which are below the water line of the sewer, and are carried over the sewer and down on the other side. At the foot of Pearl street, on Plain street, the street was carried away for a width of about thirty-five feet, on line of the sewer and down to within six or eight inches of the brickwork, but did no damage to the sewer. Two catch-basins were undermined and settled out of position, and were re-built. The cost of repairing the break in the sewer, re-building catch-basins, cleaning out the sewer, etc., was about \$188.03.

The above work is in charge of Allen Aldrich.

REPORT OF THE WATER COMMISSIONERS.

65

Inventory of stock received and delivered during 1878. together with amount on hand January 1st, 1879, at the pipe yard, belonging to City of Providence, Sewer Department :

Received during 1878, together with quantity on hand January 1st, 1878.					Received during 1878, together with quantity on hand January 1st, 1878.				
KIND.	Size in Inches.	Pieces.	Deliver'd.	Balance on hand Jan. 1, 1879	KIND.	Size in Inches.	Pieces.	Deliver'd.	Balance on hand Jan. 1, 1879
			Pieces.	Pieces.				Pieces.	Pieces.
Straight pipe, seconds.....	18	102	9	93	Curved pipe.....	6	70	7	63
Branch pipe, seconds.....	18x12	6	0	6	Straight pipe, 1 ft. lengths.....	6	360	0	360
Branch pipe, seconds.....	18x6	44	0	44	Straight pipe, 2 ft. lengths.....	6	251	87	164
Straight pipe, firsts.....	15	430	371	59	Straight pipe, 3 ft. lengths.....	6	7	4	3
Straight pipe, seconds.....	15	38	38	0	Branch pipe.....	6x6	120	0	120
Branch pipe, firsts.....	15x6	109	106	63	Invert blocks.....	8	1,069	0	1,069
Branch pipe, seconds.....	15x12	13	13	0	Invert blocks.....	4	1,700	292	1,408
Straight pipe, firsts.....	12	3,084	1,850	1,234	Manhole inverts, straight.....	12	188	1	187
Straight pipe, seconds.....	12	459	459	0	Manhole inverts, curved.....	12	16	0	16
Branch pipe, firsts.....	12x6	400	280	180	Manhole inverts, branch.....	12x12	9	0	9
Branch pipe, seconds.....	12x6	657	364	293	Lamphole inverts, curved.....	12	408	0	408
Branch pipe, firsts.....	12x12	68	28	40	Manhole frames and covers.....		466	125	341
Branch pipe, seconds.....	12x12	19	3	16	Lamphole frames and covers.....		90	4	86
Y Branch pipe, seconds.....	12x12	27	1	26	Catch-basin traps.....		300	84	222
Bevel connections, firsts.....	12	70	0	70	Catch-basin cov'rs.....		282	105	177
Bevel connections, seconds.....	12	26	17	9	Large grated covers.....		18	1	17
Bevel connections, long.....	6	786	9	777	Small grated covers.....		14	2	12
Bevel connections, short.....	6	704	99	605	Manhole covers, new pattern.....		75	34	41
Curved pipe.....	12	155	36	119	Catch-basin flag stones.....		200	84	116
					Iron sewer inlets.....	12	9	0	9
					Straight brick.....		317,400	317,400	0
					Swelled brick.....		202,100	202,100	0

Miscellaneous stock on hand :

AT THE PIPE YARD.

- 7 grated sewer inlets.
- 4 basin traps (Clapp's patent).
- 1 large basin cover (Clapp's patent).
- 6 new pattern basin traps.
- 29 catch-basin traps (old stock).
- 43 manhole frames.
- 12 small grated covers.
- 17 large grated covers.

AT THE CITY YARD.

56 corner sets of catch-basin stones and 12 extra gutter stones.
 46 side " " " " " " 15 " " "

The cargoes of seven vessels and four scows have been received as follows :

	DATE.	KIND OF MATERIAL RECEIVED.			
		Straight Brick.	Swelled Brick.	8 inch Inverts.	4 inch Inverts.
Schooner Maria.....	April 8.	30,000	.....	.....	.....
" George Hoyt.....	July 10.	.....	42,000	.....	.....
" " ".....	July 22.	.....	39,000	.....	.....
" A. G. Lawson.....	Sept. 16	.....	55,300	.....	.....
Scow.....	Oct. 10.	.....	16,500	.....	.....
".....	Oct. 18.	.....	15,100	.....	.....
".....	Oct. 23.	.....	18,200	.....	.....
".....	Oct. 27.	.....	16,000	.....	.....
Schooner Veranda.....	July 16.	.....	.....	632	878
" Urbana.....	Aug. 6.	.....	.....	578	446
Steamer A. C. Barstow.....	Aug. 12.	.....	.....	400	.....
Totals.....	.....	30,000	202,100	1,610	1,324

The brick were received for account of Providence Builders' Association contract, which is filled. The inverts were received for account of G. W. Rader & Co., and the condition of their contract is as follows :

8 inch invert blocks—ordered, 1,500; accepted, 1,208.

4 " " " " 1,000; " 1,090.

Fuller Iron Works contract for furnishing sewer castings, has been filled as follows :

300 manhole frames and covers.

20 lamphole " " "

10 large grated covers.

10 small " "

200 catch-basin traps.

220 " " covers.

Thirty car loads of Akron sewer pipe have been received for account of Providence Builders' Association contract. The condition of the contract is as follows :

KIND.	Ordered.	Accepted.	KIND.	Ordered.	Accepted.
Straight pipe, 15 inch....	350	473	Bends, 12 inch.....	150	131
“ “ 12 “	5,000	2,210	“ 6 “	50	63
Branches, 15x12.....	10	1	Bevel connections, long, 6 inch.....	100	172
“ 15x6.....	40	30	Bevel connections, short, 6 inch.. ...	500	136
“ 12x12.....	100	15	Bevel connections, 12 in.	50	70
“ 12x6.....	1,700	460			

The following is an estimate of material that will probably be required for sewer construction for the season of 1879, based upon the quantity used in 1878 :

KIND.	Size in Inches.	Number of Pieces.	KIND.	Size in Inches.	Number of Pieces.
Straight pipe, firsts.....	15	496	Branch pipe, seconds...	12x6	253
“ “ seconds ..	15	57	“ “ firsts.....	12x12	2
Branch pipe, firsts.....	15x6	96	Bevel connect'ns, sec'ds.	12	17
“ “ seconds....	15x6	54	Straight pipe, 3 ft. long.	6	3
“ “ firsts.....	15x12	20	Manh'le cov'rs, new style		10
Straight pipe “	12	1,541	Catch-basin flagstones.....		34
“ “ seconds ..	12	380	Straight brick.....		608,100
Branch pipe, firsts.....	12x6	240	Swelled brick.....		319,000

Having called your attention to the state of the Cornish Engine foundations, I would say that if it is decided to run the engine in the present condition of the same, great watchfulness and care should be maintained, the state of the work closely observed and due notice taken of any further developments relating to the foundation.

The various buildings and bridges belonging to the Water Works have received such repairs as were considered necessary to keep and maintain them in good order and proper condition.

The reservoirs are in their usual condition.

Ventilating pipes, connecting with the chimney, have been put in at Hope engine house, adding much to the comfort of both engine and boiler rooms.

The cost of engineering for the work connected with the Water Works, during the year, was \$3,518.08. The force employed consisted of Edmund B. Weston, engineer in charge of water department, William M. Brown, Jr., principal, Archibald W. Troop and Franklin I. Fuller, assistants.

Profiles from which to estimate the cost of laying water pipe have been made by the grade department, and the lines of uncurbed streets were given by the street line department.

The assistants employed on construction are required to look after the laying out of the work, to keep account of all material received on the street, used or left over and to keep a progress report, showing the progress of the work from day to day, which notes are transferred to a book in the office. Beside attending to the engineering, they also act as inspectors and see that every part of the work is properly done.

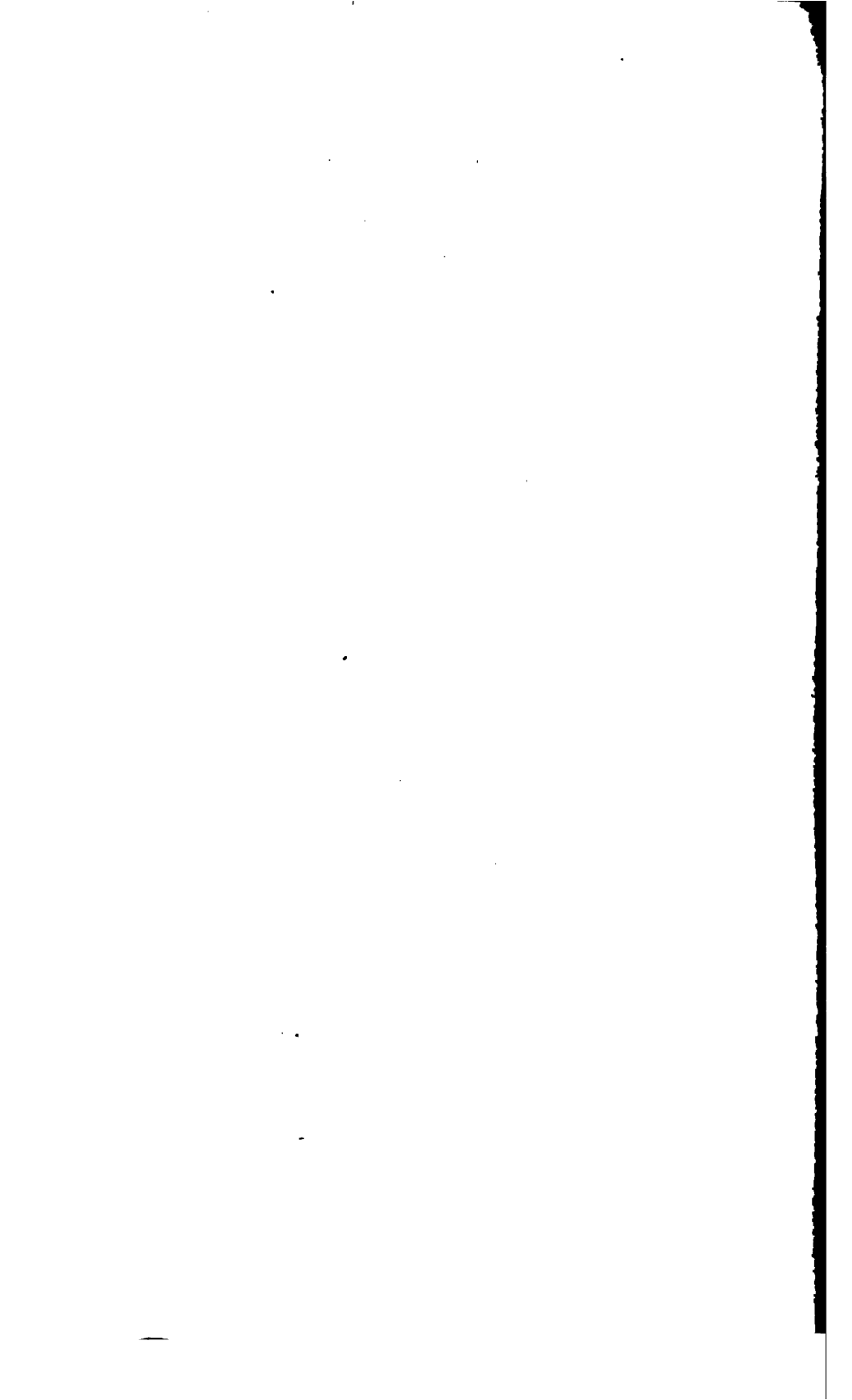
This division of the department requires a great deal of careful attention, in order that mistakes may be avoided,—the location of branches for private drains being, especially, a source of trouble and expense to the drain layer, if not properly located. I believe this work to have been faithfully and accurately performed the past year.

The required standard of cement for the past year has been sixty pounds, tensile strain, per square inch; and any cement found not to stand that has been rejected. Some two hundred and twelve thousand one hundred swelled brick have been used the past season, principally for catch-basins and outside course on eight-inch work, and so far, the result seems to show, that for the places in which they were used, they are equally as good as third and fourth quality bricks, that cost much more.

The force employed has been, Otis F. Clapp, engineer in charge of sewer department, Edwin P. Dawley and Leprilete Sweet, 2d., principals, and George Alexander and Frederick R. Arnold, assistants. The cost of engineering for the sewer department, from January 1st to December 31st, 1878, was \$7,639.51.

SAMUEL M. GRAY,

City Engineer and Supt. Water Works and Sewers.



1880.]

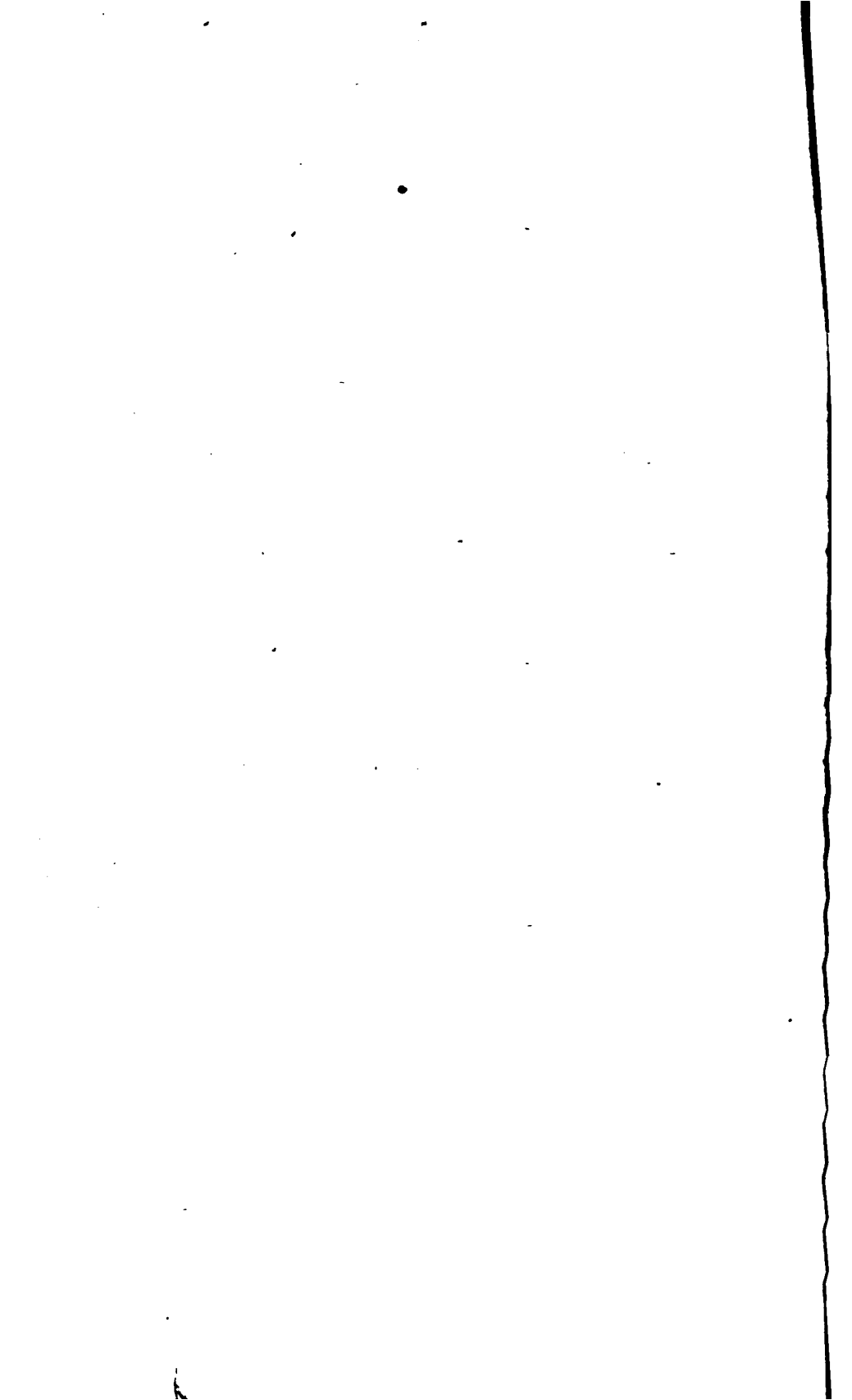
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[No. 11.]

FOURTH ANNUAL REPORT
OF THE BOARD OF
WATER COMMISSIONERS
OF THE
CITY OF PROVIDENCE,
MARCH 1, 1880,
AND
REPORT OF THE ENGINEER AND SUPERINTENDENT.



PROVIDENCE:
PROVIDENCE PRESS CO., PRINTERS TO THE CITY.
1880.



1880.]

CITY DOCUMENT.

[No. 11.]

FOURTH ANNUAL REPORT

OF THE BOARD OF

WATER COMMISSIONERS

With compliments of the

BOARD OF WATER COMMISSIONERS,

CLINTON D. SELLEW,

Secretary.

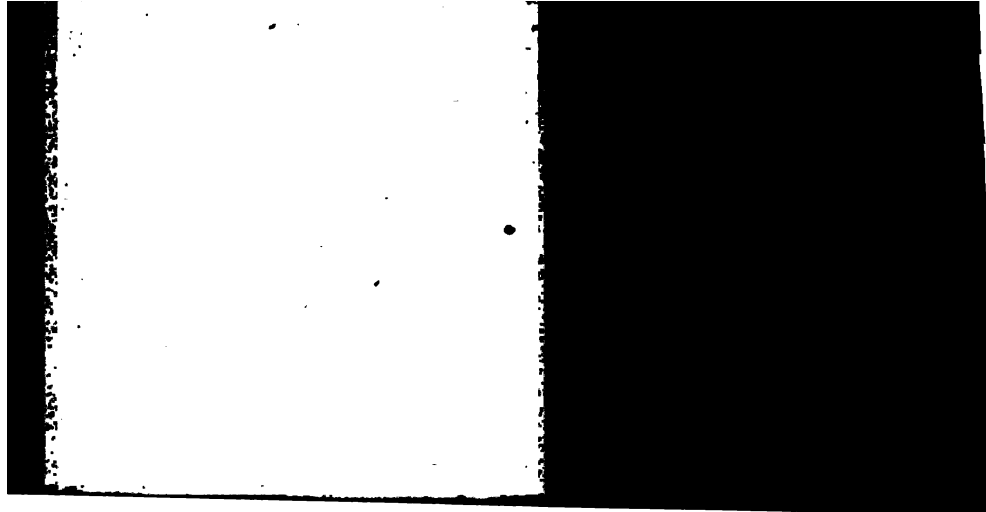
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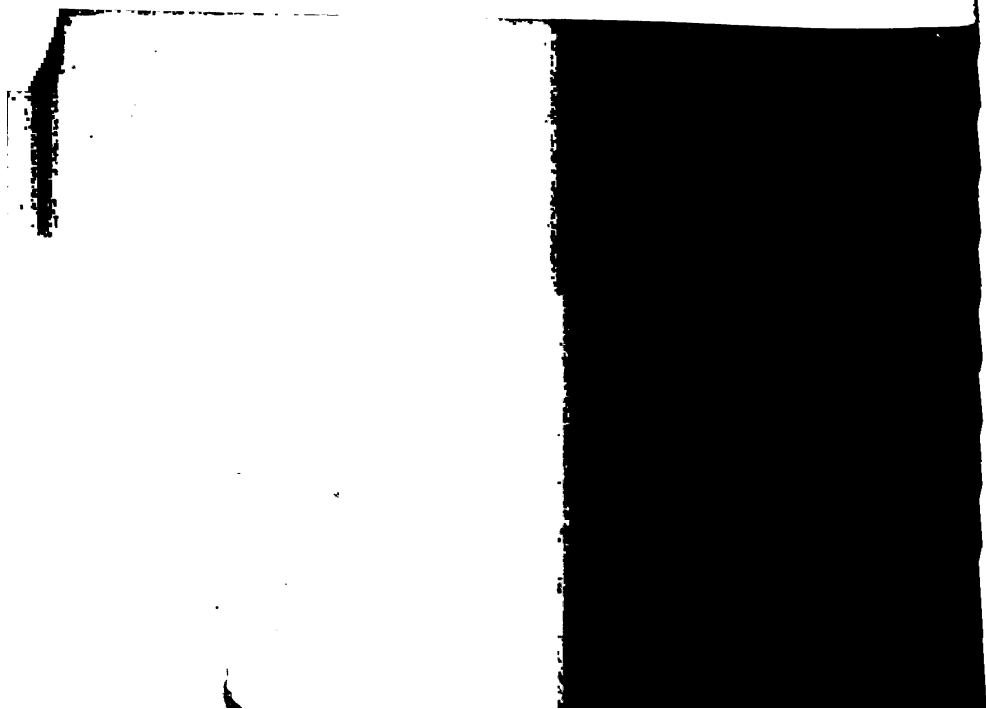
PROVIDENCE:

PROVIDENCE PRESS CO., PRINTERS TO THE CITY.

1880.



Page 1 of 1



1880.]

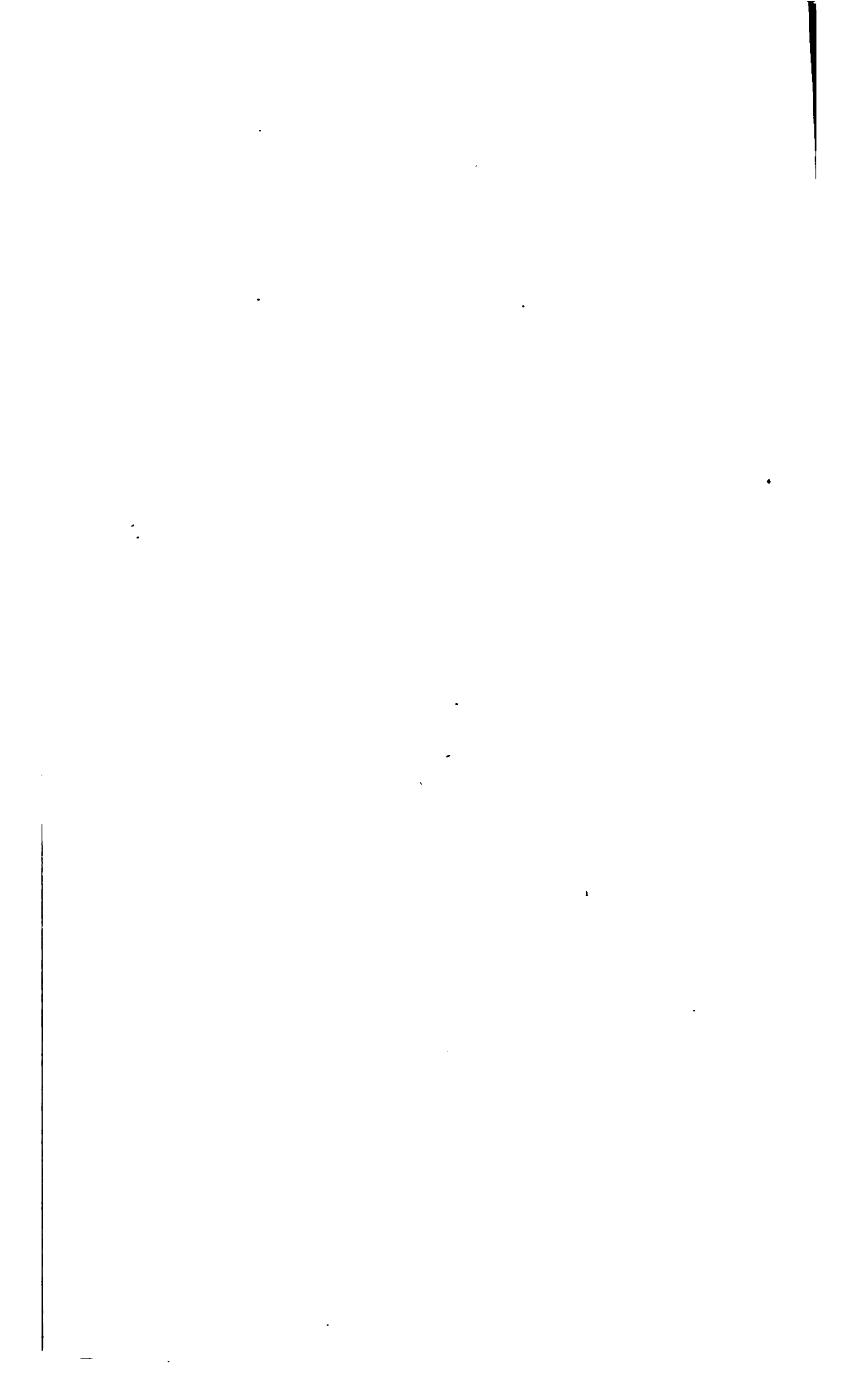
CITY DOCUMENT.

[No. 11.]

FOURTH ANNUAL REPORT
OF THE BOARD OF
WATER COMMISSIONERS
OF THE
CITY OF PROVIDENCE,
MARCH 1, 1880,
AND
REPORT OF THE ENGINEER AND SUPERINTENDENT.



PROVIDENCE:
PROVIDENCE PRESS CO., PRINTERS TO THE CITY.
1880.



ORGANIZATION
OF THE
PROVIDENCE WATER WORKS.

BOARD OF WATER COMMISSIONERS:

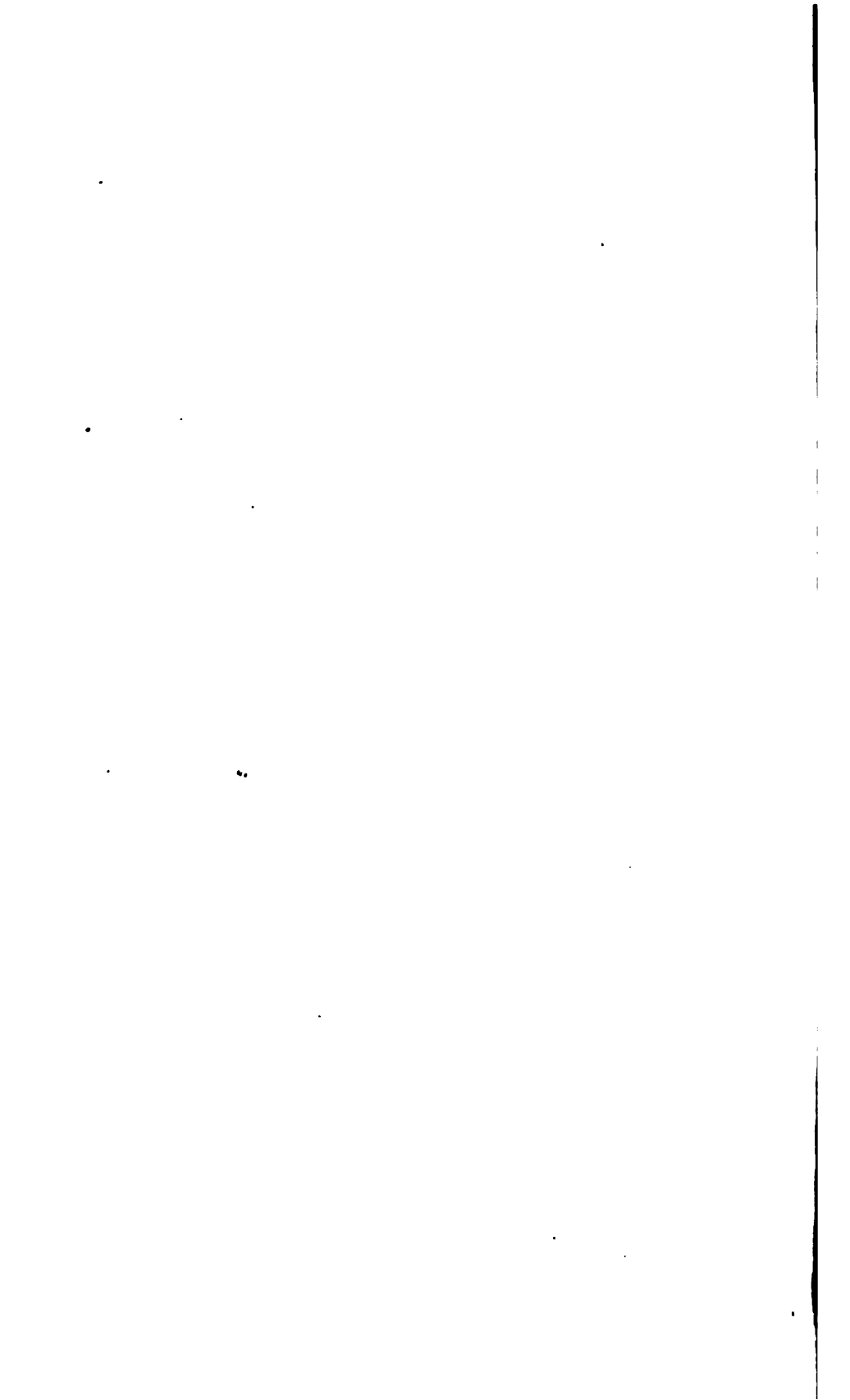
LODOWICK BRAYTON, PRESIDENT,
HENRY L. PARSONS,
NATHANIEL F. POTTER.

SECRETARY OF THE BOARD OF WATER COMMISSIONERS:

CLINTON D. SELLEW,
Office, City Hall.

CITY ENGINEER AND SUPERINTENDENT:

SAMUEL M. GRAY,
Office, City Hall.



REPORT.

BOARD OF WATER COMMISSIONERS' OFFICE, }
Providence, R. I., March 1, 1880. }

TO THE HONORABLE THE CITY COUNCIL:

The Board of Water Commissioners, elected under an Ordinance of the City Council, passed October 19th, 1876, respectfully present their fourth annual report:—

Henry L. Parsons, whose term of office expired July 1st, last, was, June 30th, 1879, re-elected for a term of three years. No change was made in the organization of the Board.

May 13th, 1879, the offer of Davenport & Manchester to furnish twenty-five tons of lead pipe, of various sizes, for the sum of three $\frac{86}{100}$ (3.85) dollars per one hundred pounds, was accepted.

The proposal of R. D. Wood & Co., of Philadelphia, to furnish, delivered on wharf in this city, ten tons of four-inch and one hundred tons of eight-inch cast-iron water-pipes, for the sum of twenty-four $\frac{10}{100}$ (24.10) dollars per ton of 2,240 pounds, was accepted May 28th, 1879. A contract was subsequently executed and has been completed.

On the 2d day of June the offer of Fuller Iron Works to

furnish special castings and service boxes, (about twenty-three tons of 2,240 pounds,) for the sum of two and one-half cents per pound, was accepted.

June 30th, 1879, the offer of Tucker & Little to furnish, as required, fifteen hundred (1,500) tons first quality egg coal, delivered at Pettaconset Pumping Station, and four hundred (400) tons of first quality stove coal, delivered at Hope Pumping Station, for the sum of three $\frac{70}{100}$ (3.70) dollars per ton of 2,000 pounds, was accepted.

The grass and pasturage of the "Gardner Farm," at Sockanosset, has been leased to Henry W. Barnes for one year from April 1st, 1879, for the sum of one hundred dollars.

A small parcel of land north of the mill site at Pawtuxet, town of Cranston, has been leased to the Union Railroad Company, (on which to locate an office and shed,) for ten years from November 23d, 1879, at an annual rental of thirty-five dollars, with the right of either party to terminate the lease on three months' notice.

During the year 1879 fifty-five plumbers' licenses were issued, all of which expired on the last day of the year.

The Cornish Engine, which the Commissioners stated in their last annual report was stopped January 23d, 1879, was started up on the 14th of July and run until the 22d of September following. During this time the Worthington Engine and boilers were put in thorough order.

The foundations of the Cornish Engine continuing to settle, the Commissioners spent much time in determining the best method of making them secure, and after full consideration of the various plans proposed, decided to drive piles through the timber foundation, both under the pump and around the stand-pipe. Before commencing the work a test

pipe was driven through the foundation to a distance of sixty-one and one-half feet without reaching solid or hard bottom. The test developed that for a distance of about twenty-five feet the material was about equal to coarse mortar sand, and below that was found the worst kind of fine quicksand of a quagmirish character. Having decided to drive piles, the pump was removed and sixteen piles, ten inches in diameter, were driven through the foundation to a depth of about twenty-five feet, holes having been cut by a boring machine made especially for that purpose. These piles were securely fastened to the timber foundation, so that there can be no upward or downward movement of the platform without working the piles in the sand, and were so located that when the pump was returned to its position its base rested upon the ends of the piles and also the timber platform. Twenty-four piles were also driven around the stand-pipe and through the platform where there had been the most settling. These were of the same diameter; were driven to about the same depth as those under the pump, and were also securely fastened to the platform, so that there can be no movement either up or down, without moving the whole forty piles. At the commencement the pile was driven from six to ten inches at each blow, and in driving the last ones the piles were settled only from one-half to three-quarters of an inch at each blow from a hammer weighing about nineteen hundred pounds, and falling upwards of twenty feet. This fact, together with the one that a portion of the platform with all its weight having been raised by driving the piles, is evidence that the sand must have been packed very hard.

So far as can be seen there has been no change in the foundations since the above named work was completed, and it is believed they have been permanently secured.

The work having been completed the engine was started on the 26th day of November; has since pumped all the water supplied by the city, and has run very satisfactorily.

The Commissioners desire to express their appreciation of the valuable counsel and earnest services of Samuel M. Gray, City Engineer, in the execution of the work.

The City of Providence, with over one hundred thousand inhabitants, is entirely dependent upon its pumping apparatus at Pettaconset for its supply of Pawtuxet water. To furnish this supply there have been provided two engines, one of a capacity of nine million gallons per twenty-four hours, and the other about one-half that quantity. During the driest season of the year, should it become necessary from any cause to depend upon the smaller engine, it is doubtful if it would furnish an adequate supply, as the consumption of water is rapidly increasing. It would seem, therefore, to be good policy to provide another engine at an early day.

The Commissioners call the attention of the Honorable City Council to the fact that their office is still without a safe, which is much needed for the convenient working of the business of the office and the security of money and valuable papers.

Water pipes were laid during the year 1879 as follows:

12 inch.....	62.9 feet
8 "	264.5 "
6 "	12,148. "
4 "	2,907. "
Total.....	15,382.4 "

Or, 2.9133 miles.

Total length of all sizes laid to December 31, 1879, inclusive, 802,785.67 feet; or 152.0427 miles.

Thirteen fire hydrants were set during last year, making

the total number December 31, 1879, eleven hundred and sixteen.

WATER METERS.

There were in use at the close of the year the following water meters :

KIND.	SIZES.							Total.
	$\frac{1}{8}$ in.	$\frac{1}{4}$ in.	1 in.	1 $\frac{1}{2}$ in.	2 in.	3 in.	4 in.	
Ball & Fitts, Piston.....	2,584	493	125	47	8	1	.....	3,258
Ball & Fitts, Rotary.....	.....	.....	13	14	2	5	3	37
Worthington.....	164	.....	.....	.....	.....	.....	1	165
Fales, Jenks & Sons.....	323	214	22	3	11	.....	3	576
	3,071	707	160	64	21	6	7	4,036

APPLICATIONS FOR WATER.

The total number of applications for a supply of water to December 31, 1879, inclusive, was nine thousand eight hundred and seventy-two.

SERVICE STOPS.

The number of service stops opened to December 31, 1879, inclusive, was nine thousand one hundred and thirty-nine.

The following table shows the number of service stops, opened by months, from the commencement to December 31, 1879, inclusive :

MONTHS.	1871.	1872.	1873.	1874.	1875.	1876.	1877.	1878.	1879.
January.....		54	33	21	34	55	15	49	9
February.....		47	18	18	7	25	23	18	9
March.....		38	34	63	7	45	32	60	19
April.....		109	109	108	32	108	82	78	52
May.....		224	206	147	102	108	136	95	89
June.....		329	295	151	172	148	114	103	71
July.....		353	261	127	141	158	83	80	49
August.....		224	209	123	83	94	91	51	51
September.....		184	147	139	101	94	80	63	44
October.....		138	135	160	92	84	81	78	79
November.....		100	104	185	86	54	73	57	63
December.....	56	83	45	122	60	35	55	45	47
	56	1,863	1,596	1,364	977	1,068	865	777	572

During the year 1879 one hundred and ten stops were closed for non-payment of bills, eighty-eight of which were re-opened; in seventy-five cases the bill and penalty of two dollars were paid, and thirteen by reason of attendant circumstances, were re-opened on payment of bills without penalty. Twenty-three stops closed for non-payment previous to 1879, were re-opened; the bills and penalty of two dollars each were paid in seventeen instances, and the remaining six, by reason of attendant circumstances, were re-opened without penalty.

Two stops closed for non-payment were permanently closed on payment of bills and a charge of five dollars each.

Sixty-five stops closed for non-payment remained unopen at the close of the year.

Twenty-two stops were permanently closed; one stop previously reported as permanently closed was re-opened. Total number permanently closed to December 31, 1879, inclusive, eighty-eight.

One stop was removed. One stop previously reported as removed was replaced. Total number removed to December 31, 1879, inclusive, thirty-five.

In one case where there was no stop cock on the premises a charge of two dollars was collected for closing and re-opening the stop.

The bill and penalty of two dollars for a stop closed for non-payment was paid, but the stop remained closed at the end of the year.

At the close of the calendar year 1879, there were in use eight thousand six hundred and fifty-six stops.

USES OF WATER.

Water was, on the 31st day of December last, supplied for the following uses :

7 armories ; 23 bakeries ; 40 banks ; 189 bar-rooms ; 1 bath-house ; 131 boarding-houses ; 4 bonnet bleacheries ; 23 bottling establishments ; 33 building purposes ; 2 burying grounds ; 1 burnisher ; 2 car-houses ; 4 carriage depositories ; 5 catch basins ; 7 chasers ; 43 churches ; 2 city barns ; 2 city bridges ; 21 city drinking fountains ; 42 city drinking troughs ; 1,116 city fire hydrants ; 15 city fire steamer and hose stations ; 1 city hall ; 14 club rooms ; 14 coal yards : 1 college ; 1 colored shelter ; 4 convents ; 2 court houses ; 1 decorator ; 1 Dexter asylum ; 3,559 dwellings of one family ; 4,407 dwellings of two families ; 391 dwellings of three families ; 566 dwellings of four families ; 72 dwellings of five families ; 86 dwellings of six families ; 8 dwellings of seven families ; 9 dwellings of eight families ; 1 dwelling of nine families ; 1 dwelling of ten families ; 1 dwelling of twelve families ; 2 dwellings of twenty-four families ; 6 dye houses ; 36 elevators ; 1 engine turner ; 8 engravers ; 2 enamel works ; 1 express carriage house ; 74 fire supplies, private ; 79 fountains, private ; 2 fountains, public ; 1 furrier ; 4,340 garden and street hydrants ; 4 gas holders ; 6 gold and sil-

ver refiners; 4 gold and silver platers; 2 grain elevators; 67 green houses; 31 halls; 1 home for aged men; 1 home for aged women; 2 hospitals; 20 hotels; 6 laundries; 6 libraries; 1 lithographer; 26 lodging-houses; 2 lumber dealers; 1 mason. *Manufacturing Establishments*.—1 agricultural implements; 1 asphalt block; 3 beer; 2 belt and picker; 3 blank book; 2 bleacherics; 2 bologna sausage; 2 boot and shoe; 2 box; 1 braiding works; 3 brass foundries; 2 breweries; 1 brush; 2 butt; 12 carriage; 2 cement pipe; 1 chain; 3 chemical; 11 cigar; 1 cigar box; 23 cloak and dress; 1 coffin; 10 confectionery; 1 corset; 5 colorers of jewelry; 11 cotton; 1 crocus; 1 cutlery; 4 die sinkers; 2 dye wood; 1 emery wheel; 4 enamellers of jewelry; 1 eyelet; 4 file; 7 furniture; 3 gas; 1 gas burner; 5 gas fixtures; 1 gas stove; 1 geer; 5 hat; 15 harness; 5 ice cream and soda water; 1 iron company; 1 iron fence; 12 iron foundries; 1 jewelers' cards; 127 jewelry; 4 lapidaries; 34 machinists; 1 mowing machine; 1 nail keg; 3 oil; 1 organ; 1 paper box; 1 paper collar; 3 paper cop tube; 2 pattern; 5 patent medicine; 1 pencil case; 4 picture frame; 2 paint works; 2 pump; 2 reed; 2 rubber goods; 1 sail; 4 sash and blind; 1 saw; 3 screw; 1 sheet iron; 1 shell comb; 2 shirt; 3 silver ware; 7 soap; 1 spiral spring; 1 starch; 1 steam boiler; 2 steam engine; 3 stencil plate; 1 stove; 2 tanners; 1 thread; 3 tin ware; 3 tool; 3 top-roll; 1 wire work; 8 woolen goods; 1 yeast. *Markets*.—69 fish; 136 meat. *Mills*.—3 drug and grain; 4 flour and grain; 11 planing. 7 motors; 3 nickel platers; 2 opera houses; 2 orphan asylums; 9 organs; 10 oyster houses; 851 offices; 15 photographers; 15 printing establishments; 10 plaster and stucco workers; 20 plumbers; 12 provision curers and packers; 7 police stations; 7 railroads; 2 reading rooms; 62 restaurants; 1 roofer; 1 spice. *Saloons*.—3 billiard; 1 bowling; 4 ice cream; 38 lager beer; 9 oyster. *Schools*.—1 boarding; 19 private; 44 public; 1 reform. *Shops*.—65 barber; 23 blacksmith; 1 carpenter; 5 cooper; 3 guusmith; 3 junk; 26 paint; 25

shoemaker; 32 tailor; 5 tinmen. 5 slaughter houses. *Stables*.—5 hack; 47 livery; 466 private; 8 sale; 111 work. 1 state house; 13 steamboats; 13 steamships; 7 steam and gas pipe fitters. *Stores*.—2 agricultural implements; 60 apothecary; 2 auction; 3 book; 38 boot and shoe; 1 bread; 2 carpet; 3 carriage trimmings; 1 chemical; 9 cigar; 25 clothing; 17 confectionery; 4 crockery; 5 drug; 49 dry goods; 88 fancy goods; 2 florist; 16 flour and grain; 12 fruit; 17 furniture; 13 gents' furnishing goods; 213 grocery, retail; 17 grocery, wholesale; 14 hardware; 3 hide and leather; 1 hoop skirt; 10 house furnishing goods; 4 house paper; 3 iron and steel; 19 jewelry; 15 liquor; 1 lime and brick; 2 manufacturers' supplies; 38 millinery; 12 newspaper; 6 oil and paint; 3 paper and paper stock; 2 pianoforte; 15 produce, wholesale; 5 sewing machine; 4 stationery; 3 stove; 8 tea; 2 trunk; 2 toy; 1 umbrella; 1 wooden ware; 1 tool; 4 woolen goods. 3 sidewalk lifts; 1 store house; 8 stone cutters; 1 theatre; 5 undertakers; 1 United States custom house building; 8 upholsterers; 5 urinals, public; 2 water boats; 1 wharf; 1 wheelwright; 1 wood turner; 13 wood yards; 47 not classed.

The amount of expenditures on account of Water
Works during the year 1879, was —

For construction and extension.....\$27,754 05

Classified as follows, viz.:

Cast iron water pipes.....	\$6,256 93
Laying water pipes.....	3,189 33
Laying service pipes.....	2,817 86
Service pipes.....	2,159 95
Rent of wharf and pipe yard.....	1,875 00
Superintendence of pipe work and service stops	1,794 51
Special castings.....	1,596 09
Stop valves and boxes.....	1,466 03

Amount carried forward.....\$21,155 20

Amount brought forward.....	\$21,155 20
Clerks' salaries.....	1,104 20
Barn on cove lands.....	1,065 37
Taps and stops.....	857 62
Horse and wagon account, (shoeing, repairs, etc., and horse keeping, to April 1, 1879,)..	759 25
Commissioners' salaries.....	637 41
Wharf expenses,—	
Salaries.....	\$492 62
Expenses	71 38—
Secretary's salary.....	563 95
Stable expenses.....	479 20
Stable expenses.....	474 97
Labor on and carting pipes.....	368 18
Public drinking fountains and troughs.....	221 12
Printing and advertising.....	31 58
Hydrant bolts.....	30 32
Sundries.....	5 68
	<hr/>
	\$27,754 05

For maintenance.....\$74,510 32

Classified as follows :

PETTACONSET PUMPING STATION.

Coal and wood.....	\$6,897 70
Foundations, Cornish Engine.	4,729 24
Engineers.....	2,588 81
Firemen.....	2,052 94
Care of grounds.....	2,042 79
Sundries.....	1,057 82
Superintendence at Pettaconset and Sockanosset....	999 96
Worthington pumping engine.....	986 01
Repair of buildings.....	788 66
Oil, tallow and waste.....	586 49
Cornish pumping engine and boll- ers.....	587 58
Labor on fuel.....	565 89
Bridge.....	89 95
	<hr/>
	\$28,923 29

SOCKANOSSET RESERVOIR.

Keeper's salary.....	\$698 50
Care of grounds, gate houses, etc..	305 21
	<hr/>
	1,003 71

Amount carried forward.....\$24,927 09

REPORT OF THE WATER COMMISSIONERS.

15

Amount brought forward.....\$24,927 00

HOPE PUMPING STATION.

Coal and wood.....	\$2,894 54	
Engineers.....	2,494 44	
Firemen.....	1,617 10	
Lights....	791 45	
Engine house, repairs and cleaning	243 85	
Oil, tallow and waste.....	217 91	
Sundries.....	212 82	
Pumping engine No. 1.....	108 54	
Pumping engine No. 2.....	195 48	
	<hr/>	8,776 13

HOPE RESERVOIR.

Keeper's salary.....	\$805 50	
Care of grounds, gate house, etc..	564 64	
	<hr/>	1,370 14

PIPE LINE.

Repairs.....	\$6,368 21	
Superintendence of pipe line and service stops.....	2,058 25	
	<hr/>	8,426 46

COMMISSIONERS' OFFICE.

Clerks' salaries.....	\$4,468 29	
Examining water fixtures and col- lecting.....	2,047 94	
Commissioners' salaries.....	1,775 07	
Secretary's salary.....	1,841 64	
Printing and advertising.....	395 49	
Books, stationery, etc.....	185 26	
	<hr/>	10,208 69

METER DEPARTMENT.

Water meters.....	\$8,199 42	
Setting and repairing meters.....	4,662 50	
Tools and fixtures for room.....	794 81	
	<hr/>	13,656 73

MISCELLANEOUS.

Taxes.....	\$4,205 28	
Real estate, care of buildings, fences, etc.....	907 54	
	<hr/>	
Amounts carried forward.....	\$5,112 77	\$67,865 15

Amounts brought forward.....	\$5,112 77	\$67,865 15
Analyses of water.....	573 86	
Telegraph lines.....	356 92	
Public drinking fountains and troughs	319 64	
Superintendent's clerk....	258 08	
Horse hire.....	252 96	
Sundries.....	165 38	
Pipe yard, office expenses.....	58 70	
Rain gauges.....	47 36	
	<hr/>	7,145 17
		<hr/>
		\$74,510 82

The amount of expenditures for the year 1879, was.....	\$103,264 37
The total amount of expenditures to December 31, 1879, inclusive, was.....	5,442,179 96
The net expenditure for construction and extension in 1879, was.....	23,814 55
The net expenditure for construction and extension to December 31, 1879, inclusive, was.....	4,679,355 99
The net expenditure for maintenance in 1879, was.....	60,925 05
The net expenditure for maintenance to December 31, 1879, inclusive, was.....	382,531 15

The total amount of appropriations to December 31, 1879, was—

For construction and extension.....	\$5,225,076 57
For maintenance from October 1, 1876...	295,000 00
	<hr/>
	\$5,520,076 57

The unexpended balances December 31, 1879, were—

For construction and extension.....	\$16,920 77
For maintenance.....	51,569 64
	<hr/>
	\$68,490 41

The amount received during the year 1879, all of which was paid to the City Treasurer, was...\$245,278 56
Classified as follows :

MAINTENANCE.

Water supplies.....	\$229,551 78	
Water meters.....	8,835 00	
Setting and repairing meters....	8,857 18	
Rents.....	875 55	
Penalties.....	188 00	
Labor and material at Pettacon- set.....	24 22	
	<hr/>	\$243,331 68

CONSTRUCTION.

Labor and material, laying ser- vice pipes.....	\$799 47	
Cast iron water pipes and spe- cials.....	354 42	
Old iron.....	331 12	
Stop-valves, boxes and covers...	216 77	
Labor and materials, laying water pipes.....	147 12	
Wharfage.....	64 53	
Labor at pipe yard.....	28 45	
Drain tile.....	5 00	
	<hr/>	1,946 88
		<hr/>
		\$245,278 56

The total amount received for water to December 31, 1879,
inclusive, was.....\$1,267,929 98

The amount of all receipts to December 31, 1879, inclusive,
was..... 1,646,796 98

The following is a statement of receipts for water, by
months from commencement to December 31, 1879, inclu-
sive:

Mon.	1872.	1873.	1874.	1875.	1876.	1877.	1878.	1879.
Jan.....	40,880 00	60,356 70	32,102 10	106,547 71	129,146 05	141,006 51	147,886 85	
Feb....	796 05	4,314 80	3,678 96	4,674 19	2,930 71	5,502 98	5,106 46	3,921 11
March..	6,671 22	6,600 73	9,221 19	4,777 42	6,777 07	9,455 64	4,318 92	4,704 11
April...	1,665 50	2,510 07	4,906 96	10,003 32	13,384 63	7,722 51	14,966 74	15,146 37
May....	2,063 41	1,706 28	2,338 50	2,574 92	2,506 33	3,307 32	2,787 37	1,967 11
June...	8,634 90	8,228 92	2,563 35	8,140 90	6,506 75	8,840 60	4,207 37	3,638 00
July...	3,496 27	6,214 24	13,756 51	9,036 23	14,056 90	9,350 82	14,756 80	14,351 00
August.	1,616 14	1,441 09	1,963 37	4,001 60	2,324 74	3,296 95	2,672 26	5,194 11
Sept....	4,933 44	7,560 64	5,541 34	5,303 34	13,063 49	3,313 36	7,457 55	6,129 11
Oct....	5,079 06	8,746 53	9,007 95	13,578 46	8,623 85	15,885 02	15,336 96	17,794 01
Nov....	477 04	872 83	1,511 03	1,291 50	908 43	1,050 65	900 30	806 00
Dec....	5,372 77	8,072 87	8,076 42	9,481 49	5,946 12	8,008 49	5,105 92	7,933 18
	41,003 51	97,786 09	132,062 30	165,144 71	183,906 73	200,030 30	218,683 33	229,581 75

The estimate made for maintenance of the works, for the financial year ending September 30, 1880, was seventy-five thousand dollars; the amount appropriated by the City Council was seventy thousand dollars; it is doubtful if the smaller amount will be sufficient.

The amount needed for construction and extension depends largely upon the amount of work ordered by the City Council.

SEWERS.

The following statements show the sewers ordered during the year 1879; the sewers completed during the same time, and the cost of each:

**SEWERS ORDERED AND COMPLETED DURING THE YEAR 1879,
AND THE COST OF EACH.**

NAME OF STREETS.	BETWEEN WHAT POINTS.	DATE OF ORDER.	COST.
Barclay street.....	From the summt, about one hundred and sixty feet to Atwell's avenue...	March 15, 1879.....	\$330 29
Eddy street.....	From a point opposite the present entrance to Rhode Island Hospital, to connect with sewer already built in Eddy street, about one hundred feet.....	April 15, 1879.....	250 96
America street.....	From summt, near Asia street, to Broadway.....	April 15, 1879.....	1,611 84

SEWER ORDERED PRIOR TO JANUARY 1, 1879, BUT COMPLETED DURING THE YEAR 1879, AND COST OF SAME.

NAME OF STREET.	BETWEEN WHAT POINTS.	DATE OF ORDER.	COST.
Maple and Plane streets....	From Beacon street to South street.....	December 30, 1878....	\$923 84

CATCH-BASINS AND OTHER WORK ORDERED BY THE CITY COUNCIL AND COMPLETED DURING THE YEAR 1879, AND THE COST OF THE SAME :

LOCATION.	DATE OF ORDER.	COST.
Lockwood street (1 basin).....	November 18, 1878..	\$80 56
Throttle the inlets to sewer in Lippitt street.....	June 20, 1879.....	133 72
Relieve the overflowing sewers in the Elm street district...	July 21, 1879.....	91 74
Connect stone drains in Church, Bowen and Thomas streets with sewer in North Main street.....	July 21, 1879.....	117 19

In addition to the above there was expended during the year 1879 :

<i>For additional catch-basins on completed sewers,</i>	\$277 25
<i>For additional work on completed sewers....</i>	37 40
<i>For catch-basins in South Main street.....</i>	1,198 92
<i>For catch-basin in Broad street, entrance to Roger Williams Park.....</i>	43 48

On the 17th of June, 1879, the Water Commissioners were "instructed not to proceed in the construction of a main drain or common sewer, through Orms and State streets, as directed by resolution No. 187 of the resolutions of the City Council, approved April 11, 1878."

Work on the following sewers, (completing the list ordered to be constructed by the Board of Water Commissioners,) had not, on the 31st day of December, 1879, commenced :

Dorrance street, from the head of the dock to the end of the pier. (When advised thereto by the joint standing committee on sewers.)

Greene street, from Washington street to Westminster street.

The amount of expenditures on account of sewers during the year 1879, was—

For construction.....\$18,582 98

Classified as follows :

Labor and materials for constructing sewers..	\$13,154 19
Salaries and office expenses.....	2,451 60
Rent of wharf and pipe yard.....	1,875 00
Inspection of connections.....	984 11
Printing.....	61 60
Buildings at pipe yard.....	43 25
Books, stationery, etc.....	13 23
	<hr/>
	\$18,582 98

Amount carried forward.....\$18,582 98

Amount brought forward.....\$18,582 98

For maintenance.....\$15,019 40

Classified as follows :

Cleaning catch-basins and sewers.....	\$8,377 70
Repairing catch-basins and sewers.....	1,626 01
Horses, wagons, carts, harnesses, etc.....	1,590 93
Superintendence of cleaning and repairs.....	1,233 35
Stable expenses.....	1,031 27
Cleaning and repairing old drains.....	567 18
Barn on cove lands.....	261 33
Horse hire.....	156 00
Telegraph lines.....	91 82
Buildings and office cove lands.....	75 17
Tide gauge ..	8 64
	<hr/>
	\$15,019 40

Total.....\$33,602 38

The amount received by the sewer department, during the year 1879, all of which was paid to the City Treasurer, was.....\$29,563 14

Classified as follows :

Constructing sewers in Brook street district..	\$28,966 24
Miscellaneous labor, sewer material, etc.....	202 72
Filling cisterns, tanks, etc.....	154 73
Cleaning private drains.....	147 62
Wharfage.....	52 57
Scrap iron.....	39 26
	<hr/>
	\$29,563 14

The following table exhibits the length and sizes of sewers constructed under the present system :

SIZE IN INCHES.	KIND.	YEAR.							TOTALS.
		1871.	1872.	1873.	1874.	1875.	1876.	1877.	
6x72.	Brick.	.....	.....	2,354.46	.....	.....	.....	530.04	630.04
8x80.	"	.....	.....	408.20	.....	.....	.....	.....	3,364.46
8x87.	"	.....	.....	410.20	.....	.....	.....	.....	2,801.16
30x54.	"	.....	.....	3,006.33	.....	.....	2,506.06	.....	3,065.33
34x51.	"	.....	.....	.....	.....	.....	.....	.....	604.50
32x48.	"	.....	.....	.....	410.86	.....	.....	.....	410.86
30x46.	"	.....	.....	.....	2,106.07	.....	2,170.35	647.78	2,910.13
28x42.	"	.....	.....	.....	984.70	.....	.....	.....	3,789.78
26x39.	"	.....	242.48	374.07	1,070.21	.....	.....	.....	1,662.16
24x36.	"	.....	.....	1,637.06	631.29	.....	.....	.....	4,719.15
22x33.	"	.....	.....	.....	1,217.70	.....	.....	70.70	6,040.01
20x30.	"	.....	.....	436.17	3,167.27	963.40	1,628.02	.....	6,344.76
18x26.	"	.....	.....	.....	.....	.....	.....	.....	142.00
16x24.	"	.....	.....	.....	.....	.....	.....	.....	482.00
6x.	"	.....	.....	1,662.00	.....	.....	2,462.96	.....	4,025.96
64.	"	.....	.....	.....	.....	.....	250.00	.....	250.00
48.	"	.....	.....	.....	1,314.70	.....	253.02	.....	1,707.72
40.	"	.....	.....	.....	.....	.....	.....	648.25	648.25
36.	"	.....	.....	.....	.....	.....	.....	105.60	105.60
32.	"	.....	.....	.....	.....	.....	.....	349.17	349.17
28.	"	.....	.....	.....	.....	.....	.....	.....	1,949.00
24.	"	.....	.....	.....	.....	.....	.....	.....	7,624.44
22.	"	.....	.....	.....	.....	.....	.....	.....	9,071.27
20.	"	.....	.....	.....	.....	.....	.....	.....	10,946.02
18.	"	.....	.....	.....	.....	.....	.....	.....	4,064.06
16.	"	.....	.....	.....	.....	.....	.....	.....	1,282.26
14.	"	.....	.....	.....	.....	.....	.....	.....	20,000.40
12.	"	.....	.....	.....	.....	.....	.....	.....	120,537.47
8.	"	.....	.....	.....	.....	.....	.....	.....	219.30
Totals in feet.....		6,074.45	11,773.42	30,344.23	61,075.55	55,125.35	24,401.16	17,142.74	220,423.32
Totals in miles.....		1.16	2.23	0.98	12.00	10.44	4.62	3.24	42.9
Catch-basins.....		71	63	281	609	360	144	138	1,791
Main-holes.....		34	116	346	710	613	293	163	9,131
Side-holes.....		.....	.....	.....	.....	.....	.....	.....	.....
Private drains laid.....		50	89	961	640	676	649	640	9,179

Thirty-six drain layers' licenses were issued during the year 1879, all of which expired on the last day of the year.

EMPLOYÉS.

The following is a detailed statement of the salaries paid to the employés of the commissioners :

	compensation.	\$2,300 00	per annum.
Clinton D. Sellew, secretary,	"	1,700 00	" "
Phillip S. Chase, book keeper,	"	1,100 00	" "
Thomas C. Gushee, clerk,	"	900 00	" "
Walter F. Slade, "	"	850 00	" "
Leonard N. Austin, Jr., clerk,	"	600 00	" "
Jesse W. Coleman, "	"	1,100 00	" "
Frederic A. Arnold, examiner of water fixtures and collector,	"	875 00	" "
Albert C. Winsor, assistant examiner of water fixtures and collector,	"	900 00	" "
William F. Jones, in charge of service stops,	"	1,400 00	" "
Andrew B. Purdy, superintendent of pipe work,	"	1,200 00	" "
S. Horace Wheeler, superintendent of service pipe work,	"	1,100 00	" "
Edward A. Moran, superintendent of meter work,	"	1,000 00	" "
William H. Patterson, clerk at pipe yard,	"	1,000 00	" "
Horatio L. Briggs, superintendent at Pettaconset and Sockanosset,	"	1,400 00	" "
Simeon Noell, pumping engineer at Pettaconset,	"	1,000 00	" "
William Harry, " " " "	"	75 00	per month.
John Hamilton, fireman at Pettaconset,	"	60 00	" "
James Hamilton, " " "	"	1 50	per day.
Alexis C. Miller, keeper of Sockanosset reservoir,	"	1,200 00	per annum.
Charles B. Smith, pumping engineer at Hope station,	"	1,100 00	" "
Joseph F. Plant, " " " " "	"	65 00	per month.
Michael Hamill, fireman at Hope station,	"	65 00	" "
Judson Davis, " " " "	"	2 00	per day.
Eben Burlingame, keeper of Hope reservoir,	"	1,300 00	per annum.
Allen Aldrich, superintendent of sewer maintenance department,	"	900 00	" "
Richard M. Wood, clerk, sewer maintenance department,	"	40 00	per month.
William H. Fiske, stable keeper,	"	35 00	" "
Thomas A. McDonald, night hand at stable,	"	1,000 00	per annum.
R. B. S. Hart, inspector of private drains,	"	300 00	" "
Harvey F. Payton, superintendent's clerk,	"		

Although there has been a reduction of the clerical force

in the office of this department, while there is constantly an increasing amount of detail work, under the efficient management of Clinton D. Sellew, Secretary, the public, we believe, have been promptly and faithfully served.

Trial balances of ledgers, December 31st, 1879, and the report of the Engineer and Superintendent are hereunto appended and made parts of this report.

L. BRAYTON, HENRY L. PARSONS, N. F. POTTER,	}	<i>Board of Water Commissioners.</i>
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TRIAL BALANCE OF LEDGER, DECEMBER 31, 1879.

DR.

CONSTRUCTION.

<i>Providence Water Works, for construction,</i>	\$4,679,355 99
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<i>A. & W. Sprague Manufacturing Company:</i>	
---	--

(Due from said company on account of grading a portion of Reservoir avenue, as per the written agree- ment of the company,)	\$2,500 00
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<i>R. O. Peck,</i>	71 77
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	<u>2,571 77</u>
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City Treasurer:

(Payments to him for receipts for labor, materials, engineering ser- vices on sewers, other expenses incurred by Water Works, for sewers, etc.,)	324,519 35
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MAINTENANCE.

<i>Providence Water Works, for maintenance,</i>	382,531 15
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City Treasurer:

(Payments to him for labor and mate- rials, water meters, rents, etc.,)	54,847 70
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City Treasurer:

(Total amount of receipts for water,)	1,267,929 93
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	<u>\$6,711,255 89</u>
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CR.

<i>Penalties,</i>	1,146 00
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<i>Water,</i>	1,267,929 93
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<i>Approved bills,</i>	5,442,179 96
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	<u>6,711,255 89</u>
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TRIAL BALANCE OF LEDGER, SEWER DEPARTMENT, DEC. 31, 1879.

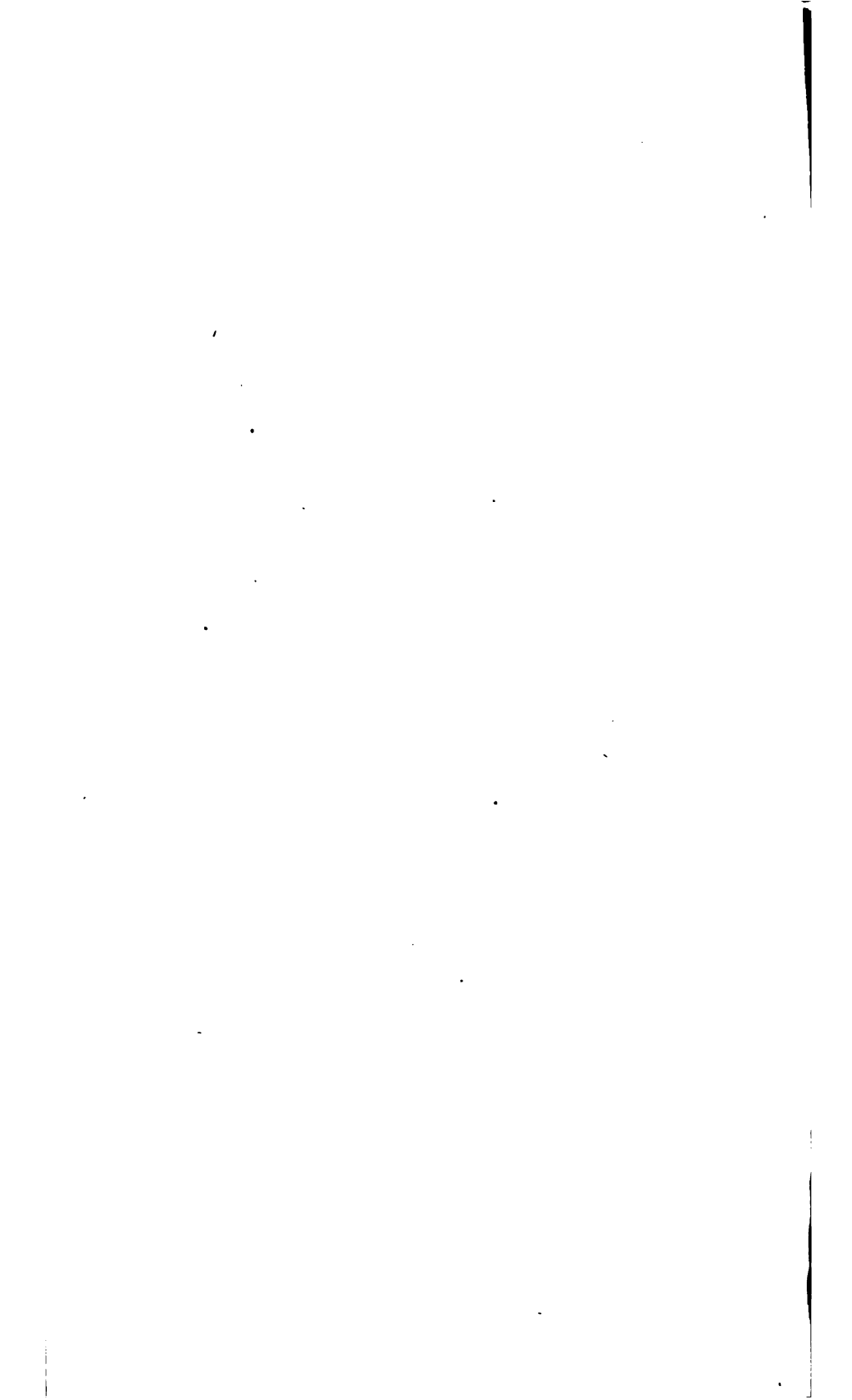
DR.

Engineering department to March 10, 1877,	-	-	\$3,614 84
City Treasurer,	-	-	43,555 11
Books, stationery, etc.,	-	-	188 08
Removal to Point Street Wharf,	-	-	624 95
Sheet piling,	-	-	121 07
Tools,	-	-	4,893 89
Sewer pipes, rings, covers, etc.,	-	-	4,891 09
Manhole frames and covers,	-	-	2,415 30
Catch-basin traps,	-	-	465 10
Catch-basin covers,	-	-	261 89
Flag stones,	-	-	333 54
Rent of wharf and pipe yard,	-	-	4,306 72
Grated covers,	-	-	76 08
Catch-basin stones,	-	-	1,880 00
Manhole frames and covers,	-	-	362 41
Bricks,	-	-	4,096 20
Stones from Brook street sewer,	-	-	2,068 31
Carting stones from sewers to cove lands,	-	-	1,932 62
Iron sewer connections,	-	-	23 85
Invert blocks,	-	-	2,865 93
Printing,	-	-	3,315 16
Inspection of connections,	-	-	11,183 19
Buildings at pipe yard,	-	-	913 21
Salaries and office expenses,	-	-	35,031 13
John Gillen,	-	-	15 30
Catch-basin, etc., in Custom House lane,	-	-	20 30
Catch-basins on old drains,	-	-	7,911 28
Completed sewers,	-	-	970,356 16
Completed storm sewers,	-	-	11,642 70
Maintenance of sewers,	-	-	83,531 14
			<hr/>
			\$1,203,897 72

CR.

Approved bills,	-	-	-	-	\$1,203,897 72
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REPORT
OF THE
SUPERINTENDENT AND ENGINEER.



REPORT.

CITY ENGINEER'S OFFICE, CITY HALL,
PROVIDENCE, R. I., January 15, 1880. }

To the Board of Water Commissioners:

GENTLEMEN :—Agreeable to Section 7 of an ordinance approved March 10, 1877, I respectfully submit the following report :—

WATER WORKS.

Water pipes have been laid in the following streets during the year 1879 :

Name of Street.	Between What Points.	Water turned on	Sizes and Lengths of Pipe Laid.			
			4 inch.	6 inch.	8 inch.	12 inch.
Allston street....	Harold and Bryant streets....	April 9..	.....	371.7	.....	.....
Amherst street....	Steuben and Hyat streets.....	Oct. 10..	.....	674.8	.....	.....
Ashburton street....	Tremont street, northerly.....	April 14..	.....	673.	.....	.....
Abbott street....	Extended easterly.....	June 2..	.....	323.8	.....	.....
Allen's avenue....	Public street, northerly.....	June 11..	.....	43.2	.....	.....
Alma street.....	Candace street, westerly.....	Dec. 16..	.....	281.	.....	.....
Asia street.....	America and Tefft streets.....	Nov. 17..	.....	300.	.....	.....
Audrey street....	Bowdoin street, southerly.....	Sept. 27..	.....	71.5	.....	.....
Anthony avenue..	Cranston street and Noyes avenue..	Aug. 9..	.....	660.	.....	.....
Admiral street ..	Extended easterly.....	Aug. 2..	.....	.....	48.	.....
Albro street.....	Atwell's avenue and Federal street	July 16..	.....	382.1	.....	.....
Bryant street....	Allston street, north-westerly.....	May 10..	.....	190.6	.....	.....
Baker avenue....	High street, northerly.....	April 30..	.....	294.4	.....	.....
Butler avenue....	Waterman and South Angell streets	May 8..	.....	544.	.....	.....
Bowdoin street...	Appleton and Audrey streets.....	Sept. 28..	.....	150.	.....	.....
Cypress street....	North Main street, easterly.....	April 26..	.....	294.4	.....	.....
Dike street.....	Edward street, westerly.....	Aug. 4..	.....	130.4	.....	.....
Douglas avenue..	Vandewater street, south-easterly ..	Dec. 30..	.....	.....	216.5	.....
Carried forward.....			.....	5340.8	204.5	.....

Name of Street.	Between What Points.	Water turned on	Sizes and Lengths of Pipe Laid			
			4 inch.	6 inch.	8 inch.	12 inch.
	Brought forward.....			5340.8	261.5	
Fruit street....	Orchard and Plum streets.....	Sept. 22..		154.		
Fenner avenue....	Reservoir avenue, northerly.....	July 9..				61
Federal street....	Tefft and Messenger streets.....	Nov. 17..		162.		
Gosler street....	Extended westerly.....	Nov. 12..		63.2		
George street....	Ives and Gano streets.....	Nov. 24..		465.		
Handy street....	Amherst street, northerly.....	Dec. 10..		325.		
Hyatt street....	Kossuth and Amherst streets.....	Oct. 9..		224.		
Harold street....	Allston street, southerly.....	April 9..		43.2		
Kossuth street....	Julian and Hyatt streets.....	Oct. 7..		702.		
Milk street....	Public and Peace streets.....	Dec. 3..		406.		
McDonough street....	Extended westerly.....	July 17..		181.		
Maple street....	Plain and Beacon streets.....	May 28..		356.3		
No. Burial Ground	Distribution.....	Nov. 10..	2907			
Public street....	Eddy street and Allen's avenue.....	June 11..		1013.		61
Roger Williams Park.....	Distribution.....	June 12..		270.5		
Salem street....	Potter's avenue, northerly.....	Sept. 26..		387.5		
Stamper street....	Stevens and Hewes streets.....	June 18..		348.5		
Valley street....	Calais and Senter streets.....	July 11..		231.		
Vandewater st....	Drew street, north-easterly.....	June 14..		304.5		
Whipple street....	Douglas avenue, north-easterly.....	Aug. 2..		638.5		
Webster street....	Ashburton street, westerly.....	April 10..		251.		
Totals.....			2907	12148.	261.5	61

Included in the foregoing are the following cut pipes, branches, gates, etc. :

	4 inch.	6 inch.	8 inch.	10 inch.	12 inch.	16 to 12 inch.	12 to 8 inch.	8 to 6 inch.	6 to 4 inch.
Cut pipes.....	7	74	1		3				
Branches.....	9	46	3	1	3				
Curved pipes.....	6	12			3				
Gates.....	8	27	1		2				
Bevel hubs.....	4	6			1				
Sleeves.....	1	7	3	1	1				
Caps.....	15	68	10						
Reducers.....						1	1	2	2

Thirteen hydrants have been set during the year, the location, size of pipe, where set, and the month when set, is shown by the following table :

LOCATION.	SIZE OF PIPE.		MONTH WHEN SET.
	6 inch.	12 inch.	
Allston street, north-west corner Bryant street.....	1	.....	April.
Cypress street, south side, 276 feet east of North Main street..	1	.....	"
Abbott street, north side, 460 feet east of North Main street..	1	.....	June.
Public street, north-west corner of Allen's avenue.....	1	.....	"
Vandewater street, north-west corner of Grand Broadway...	1	.....	"
Amherst street, north-west corner of Handy street.....	1	.....	July.
Fenner avenue, north corner of Reservoir avenue	1	1	"
Albion street, west side, 146 feet south of Atwell's avenue....	1	.....	"
Whipple street, west side, 442 feet north of Douglas avenue..	1	.....	August.
Anthony avenue, north corner of Pelce street.....	1	.....	"
Salem street, north corner of Jessamine street.....	1	.....	September.
Kossuth street, north-west corner of Joslin street	1	.....	October.
Roger Williams Park, opposite What Cheer Cottage.....	1	.....	November.
Totals.....	12	1	

The total number of hydrants set to January 1, 1880, is 1,116, including 19 in the town of Johnston. One 4 inch hydrant has been set in Roger Williams Park.

Following is a statement of the length of each size of water pipe in the ground, January 1, 1880, considered as mains :

SIZE OF PIPES.	Length in Feet.		Length in Miles
36 inch.....	10,084.00		1.9098
30 ".....	59,076.00		11.1886
24 ".....	23,942.00		4.5345
20 ".....	6,846.00		1.2966
16 ".....	28,685.40		5.4328
12 ".....	45,308.10		8.5811
10 ".....	10,507.00		1.9900
8 ".....	110,155.23		20.8627
6 ".....	504,729.94		95.5928
*4 ".....	3,452.00		0.6538
Totals.....	802,785.67		152.0427

* At Pipe Yard, Roger Williams Park and North Burial Ground.

Ninety-eight feet of four inch pipe has been taken out in Roger Williams Park, and six inch pipe substituted therefor.

Gate-boxes and hydrants in the following places have been changed to accommodate highway work :

GATE-BOXES CHANGED.

1	on the corner of North Main and Waterman streets.
1	" " " North Main and Steeple streets.
1	" " " Thayer and George streets.
1	" " " Cook and George streets.
1	" " " Transit and Thayer streets.
1	" " " Angell and Hope streets.
1	" " " Hylstead street and Pavillion avenue.
1	" " " Clark and Hylstead streets.
1	" " " Branch avenue and Oppen street.
1	" " " Branch avenue and Woodward road.
2	" " " Broad and Congress streets.
1	" " " Ives and George streets.
1	" " " Jewett and Holden streets.

Total, 14

One hundred and fifty-one iron gate-boxes were set in place of wooden boxes removed.

HYDRANTS CHANGED.

1	at the corner of Lockwood and Clay streets.
1	on Bellevue avenue, 440 feet east of Cranston street.
1	" " " 900 " " " "
1	on the corner of Greenwich and Henry streets.
1	on Bacon street, 360 feet east of North Main street.
1	from Martin street to Ashburton street.
1	on corner of Amherst and Steuben streets.
1	on Linden street, between Hayward and Pine streets.
1	on the corner of North Main and Abbott streets.
1	on South Water street, between James and Transit streets.
1	on Lippitt street, 128 feet west of Dwight street.
1	on Manton avenue, opposite Dyerville Mill.

Total, 12

Following is a statement of repairs made on distribution pipes, hydrants and street sprinklers during the several months of the year :

MONTHS.	LEAKS IN DISTRIBUTION PIPES REPAIRED.				Totals.	Hydrants Repaired.	Street Sprinklers Repaired.
	SIZE OF PIPE.						
	4 inch.	6 inch.	8 inch.				
January.....					24		
February.		2		2	14		
March.....					104		
April.....			1	1	10		
May.....		1		1	29		
June		2		2	23		
July.....		1		1	15		
August.....		4		4	15	1	
September.....		1	1	2	16		
October		2		2			
November.....			2	2	2		
December.....	1	1		2	2	1	
Totals.....	1	14	4	19	254	2	

Of the hydrants repaired, two hundred and forty-six have been furnished with improved valves, making the total number furnished with improved valves five hundred and seventy-six. Two new sprinkling hydrants have been set, one on Beacon street, near Friendship street, and one on Broad street, near Gallup street.

In addition to the list of water pipes laid, there has been 300 feet of six inch pipe on Jewett street and Armington avenue, and 479 feet of eight inch pipe on Butler avenue, lowered on account of bringing said streets to grade.

During the year water pipe has been laid for special cases; the location, for whom laid, size of pipe, and the purpose for which laid, are shown in the following table:

LOCATION.	FOR WHOM LAID.	Lengths of Pipe.			FOR WHAT PURPOSE LAID.
		2½ Inch.	4 Inch.	6 Inch.	
Allen's avenue...	Providence Gas Co.....		6.40		Fire supply.
Valley street.....	Charles Fletcher.....		6.00		" "
Westminster st..	Phoenix Building.....	6.00			Elevator supply.
Valley street.....	Richmond Print Works..			16.50	Fire supply.
Fulton street.....	H. T. & A. N. Beckwith..		48.00		Fire and elevator supply extension.
Eddy street.....	Kendrick Loom Co.....		7.80		Fire supply.
State Farm.....	State.....			141.	Connecting mains.
Pettaconset. . .	City.....		6.00		Meter for State Farm.
	Total.....	6.00	74.20	157.50	

Included in the foregoing are the following cut pipes, branches, gates, etc. :

KIND.	2½ Inch.	4 Inch.	6 Inch.	8 Inch.	6 to 5 Inch.	Totals.
Cut pipes.....		2	4			6
Branches.....			6	2		8
Gates.....	1	3	4	1		9
Quarter turns.....			2			2
Sleeves.....		2	5			7
Curved pipes.....			1			1
Reducers.....					2	2

The above work is in charge of Andrew B. Purdy.

Schedule of water works material received and delivered during the year, also the balance on hand January 1, 1880, at the pipe yard :

MATERIAL.		On hand, January 1, 1879.	Received, from street, or trans- ferred.	Rejected, worthless, or trans- ferred.	Received during the year.	Delivered during the year.	On hand, January 1, 1880.
KIND.	Size, Inches.	Pieces.	Pieces.	Pieces.	Pieces.	Pieces.	Pieces.
Straight pipe..B.....	36	1					1
" " "A.....	36	3					3
" " "a2.....	36	4					4
" " "B.....	30	5					5
" " "b2.....	30	4					4
" " "B.....	24	42		9			33
" " "A.....	24	17			11		28
" " "B.....	20	17					17
" " "B.....	16	289					289
" " "A.....	16				13	11	2
" " "B.....	12	397				3	394
" " "A.....	12	448				2	446
" " "B.....	10	23					23
" " "B.....	8	21			379	22	378
" " "A.....	8	373		1			372
" " "B.....	6	1,853	2			1,039	816
" " "A.....	4				400	262	138
Branch pipe.....	30x30	1					1
" " ".....	30x24	1					1
" " ".....	30x20	1					1
" " ".....	30x16	1					1
" " ".....	30x12	1					1
" " ".....	30x10	1					1
" " ".....	30x8	1					1
" " ".....	30x6	2					2
" " ".....	30x24x12	1					1
" " ".....	30x12x8	1					1
" " ".....	30x8x8	1					1
" " ".....	30x8x6	1					1
" " ".....	24x24	1					1
" " ".....	24x16	1					1
" " ".....	24x12	1					1
" " ".....	24x10	1					1
" " ".....	24x8	1					1
" " ".....	24x6	1					1
" " ".....	24x8x8	1					1
" " ".....	24x6x6	1					1
" " ".....	20x16	1					1
" " ".....	20x12	1					1
" " ".....	20x10	1					1
" " ".....	20x8	1					1
" " ".....	20x6	1					1
" " ".....	20x10x8	1					1
" " ".....	20x8x6	1					1
" " ".....	20x6x6	1					1
" " ".....	16x16	1					1
" " ".....	16x12	1					1
" " ".....	16x10	1					1
" " ".....	16x8	13					13
" " ".....	16x6	28					28
" " ".....	16x12x12	1					1
" " ".....	16x8x8	1					1
" " ".....	16x6x6	1					1
" " ".....	12x8x6	1	1				2
" " ".....	12x12	4					4
" " ".....	12x10	1					1
" " ".....	12x8	10				1	9
" " ".....	12x6	14				1	13
" " ".....	12x8x8	2					2
" " ".....	12x8x6				1		1
" " ".....	12x6x6	3				1	2
" " ".....	10x8	5			4		9
" " ".....	10x6	4	1			1	4
" " ".....	10x8x8	2		1			1
" " ".....	10x8x6	1					1

MATERIAL.		On hand, January 1, 1879.	Received from street, or trans- ferred.	Rejected, worthless, or trans- ferred.	Received during the year.	Delivered during the year.	On hand, January 1, 1880.
KIND.	Size. Inches.	Pieces.	Pieces.	Pieces.	Pieces.	Pieces.	Pieces.
Branch pipe.....	10x6x6	1	1				2
" ".....	8x8	3			15		18
" ".....	8x6	10			6	3	13
" ".....	8x8x8	3					3
" ".....	8x8x6	1					1
" ".....	8x6x6	2			5		2
" ".....	8x4	2					2
" ".....	6x8	32		1		17	14
" ".....	6x6	44	1			22	23
" ".....	6x8x6	4					4
" ".....	6x6x6	4			6	9	1
" ".....	6x6	4					4
" ".....	6x4	9			1	4	6
" ".....	4x4x4				4	3	1
" ".....	4x4				8	6	2
" ".....	4x4						5
Flang'd branch pipe	4x4	6					
Blow-off branches..	30	1					1
" ".....	24	1					1
Man-holes.....	36	1					1
" ".....	30	1					1
" ".....	24	1					1
Curved pipe.....	30	7					7
" ".....	24	6	6				12
" ".....	20		6				6
" ".....	10	2					2
Blow-off bends.....	8	2					2
Quarter turns.....	8	6					6
" ".....	6	4				2	2
" ".....	4		2		10		12
Eighth turns.....	12	3				3	
" ".....	10	8					3
" ".....	8	6			4		10
" ".....	6	14	3		10	4	23
" ".....	4		2		6	3	4
Sixteenth turns....	10	4					4
" ".....	8	2			6		8
" ".....	6	8		5	40	7	36
" ".....	4				4	3	1
Bevel hubs.....	12	10					10
" ".....	10	3					3
" ".....	8	17					17
" ".....	6	10	2			6	6
" ".....	4				4	4	
Sleeves.....	36	1					1
" ".....	30	28					28
" ".....	24	12					12
" ".....	20	2					2
" ".....	16	1					1
" ".....	12	13		1		1	11
" ".....	10	2	1			1	2
" ".....	8	10	1			3	8
" ".....	6	19		1		12	6
" ".....	5				3		3
" ".....	4	1	1			1	1

MATERIAL.		On hand, January 1, 1879.	Received from street, or trans- ferred.	Rejected, worthless, or trans- ferred.	Received during the year.	Delivered during the year.	On hand, January 1, 1880.
KIND.	Size. Inches.	Pieces.	Pieces.	Pieces.	Pieces.	Pieces.	Pieces.
Collars.....	36		1				1
".....	30	3					3
".....	24	4					4
".....	8	9					9
".....	6	22			2		24
Reducers.....	30 to 24	1					1
".....	24 to 12	1					1
".....	20 to 16	1					1
".....	16 to 12	1			1	1	1
".....	12 to 8	4				1	3
".....	10 to 8	1					1
".....	8 to 6	4				2	2
".....	6 to 5	7				2	5
".....	6 to 4	8				2	6
Flange reducer.....	24 to 12		1				1
Gates.....	16	5					5
".....	12	6				2	4
".....	8	7			10	2	15
".....	6	49			20	31	38
".....	4	4			10	8	6
".....	2½	5		2		1	2
".....	1½				4	2	2
Gate-boxes, round..		8	3		160	145	26
" oblique		5					5
Gate-box rings.....		82	8		17	9	96
" covers.....		85		1	17	10	93
Hydrants.....	8	37	1			13	25
".....	4				1		1
Hydrant boxes.....		33				14	19
" box covers		41				15	26
Spigot and plug caps	16	3					3
" " " "	12	11				1	10
" " " "	10	1					1
" " " "	8	18		1	41	10	48
" " " "	6	13	11		194	68	146
" " " "	4	1			20	15	6
Blow-off covers....	6				18	18	
Valve ".....	8				43	16	27
" ".....	6				72	34	38
Bell caps.....	30	3					3
" ".....	24	7		1			6
" ".....	20	3	3				6
" ".....	16	6	1				7
" ".....	12	5		4			1
" ".....	10	4					4
" ".....	8	20		18			2
" ".....	6	119		104			15
Bonnet valves and screws.....	24	1					1
Bonnet valves and screws.....	12		1				1
Bonnet valves and screws.....	10	1					1
Bonnet valves and screws.....	8	1					1
Bonnet valves and screws.....	6	9				1	8

MATERIAL.		On hand, January 1, 1879.	Received from street, or trans- ferred.	Rejected, worthless, or trans- ferred.	Received during the year.	Delivered during the year.	On hand, January 1, 1880.
KIND.	Size. Inches.	Pieces.	Pieces.	Pieces.	Pieces.	Pieces.	Pieces.
Bonnet and screw..	6	4	1				5
"	6	2					2
Hydrant valves.....		28	4				32
" nuts.....			5				5
" bottoms.....			6				6
Small covers for hydrant boxes.....		60		11			49
Screws for gates....	36	3					3
Air cocks for gates.....		17		1			16
" " " mains.....		9		1			8
Stuffing boxes.....		8					8
Sewer inlets.....	6		9				9
Danversport brick.....		20,604					20,604
Drain tile.....	3	1,300					1,300
" "	4	2,400					2,400
							Feet.
Pieces of pipe.....	30						40
" " "	24						29
" " "	20						25
" " "	16						95
" " "	12						12
" " "	10						32
" " "	8						37
" " "	6						32
" " "	4						26
		Lbs.			Lbs.	Lbs.	Lbs.
Pig lead.....		8,370			11,501	11,280	8,591
Yarn.....		195			200	145	250

Schedule of material for the extension of water pipes used during the past year, the balance on hand January 1, 1880, and the estimated amount required for the coming year :

MATERIAL.		Used during the year.	On hand January 1, 1880.	REQUIRED FOR THE COMING YEAR.			
				Pieces.	WEIGHT.		
KIND.	SIZE.	Pieces.	Pieces.		Pounds.	Tons.	Total Tons.
Straight pipe..B..	6	1,039	816	1,500	.....	269.20	269.20
Branches.....	6x6x6	9	1	15	3,525	.....	.....
"	6x6	22	23	15	2,880	.....	.....
"	6x8	17	14	10	2,180	.....	.....
"	8x8x6	.....	1	2	630	.....	.....
Eighth turns.....	12	3	.....	4	1,772	.....	.....
Reducers.....	8 to 6	2	2	2	404	.....	.....
Bevel hubs.....	6	6	6	8	720	.....	.....
Gates.....	4	8	6	5	.....	.....	.....
Sleeves.....	16	.....	1	2	414	.....	.....
"	6	12	6	12	672	.....	.....
"	4	1	1	6	228	.....	5.98
Hook bolts for hydrants.....	.....	26	16	20	.....	.....	.....
Stay bolts for hydrants.....	.....	50 or 100	60	100	.....	.....	.....
		Lbs.	Lbs.		Lbs.		
Pig lead.....	.....	11,280	8,591	.....	8,000	.....	.....

SERVICE PIPE WORK.

During the year five hundred and sixty-three (563) service pipes have been laid, the locations of four have been changed and larger pipes substituted, three locations changed and same pipe used, and four larger pipes relaid in same locations.

The following table shows the lengths and sizes of services laid, and the number of taps, stops and service boxes set during the year:

MONTH.	LENGTH OF SERVICES LAID IN FEET.					NUMBER OF TAPS SET.					NUMBER OF STOPS SET.					Service Boxes set.
	SIZE OF PIPE.					Totals.	1/2 Inch.	1 Inch.	1 1/2 Inch.	Totals.	1/2 Inch.	1 Inch.	1 1/2 Inch.	Totals.		
	1/2 Inch.	1 Inch.	1 1/2 Inch.	1 Inch.	1 1/2 Inch.											
January.....		51.0				51.6	3				3				3	3
February.....		26.1	20.2			46.3	1	1			2		1		3	3
March.....	22.4	430.6	42.8			495.8	2	21	3		26	2	23	3		30
April.....	126.2	657.3	34.1	59.7	7.9	885.2	9	44	2	4	60	8	40	2	4	64
May.....	257.3	692.5	77.7		5.8	1,033.3	13	39	5		58	16	41	6		64
June.....	119.8	860.4	88.8	50.1	27.0	1,146.1	11	45	4	4	67	11	50	4	4	72
July.....	211.6	548.4	54.6	22.2	8.5	845.3	14	25	4	1	45	16	30	3	1	51
August.....	182.0	565.2	116.5	19.0		892.7	6	28	8	1	43	8	35	8	1	52
September.....	138.7	385.4	80.7	33.1		637.9	8	24	10	2	44	9	26	10	2	47
October.....	238.1	683.2	179.3	49.7		1,450.3	16	53	11	2	81	16	59	12	2	89
November.....	166.1	422.4	114.9		17.0	723.4	11	31	4		48	11	35	5		53
December.....	186.7	484.4	64.8	41.9	7.0	767.8	12	21	5	3	42	12	25	6	3	47
Totals.....	1,604.9	6,107.5	874.4	276.7	66.2	7,065.7	101	335	87	17	9	519	100	380	90	576

Two service pipes have been removed for non-use during the year.

The following work was done for and charged to plumbers :

The mains have been tapped thirty-four times to supply private pipes. Opened and back-filled one thousand six hundred fifty-one and five-tenths feet of trenching, and furnished and laid eight hundred forty-one and five-tenths feet of lead pipe of the following sizes, viz. :

$\frac{1}{2}$ inch.	$\frac{3}{4}$ inch.	$\frac{1}{2}$ inch.	1 inch.	$1\frac{1}{2}$ inch.	$1\frac{1}{2}$ inch.	Total.
72 feet.	528.9 feet.	171.9 feet	48.5 feet.	17 feet.	8.2 feet.	841.5 feet.

And furnished and put on fifty-seven three-fourths, one one-inch, and two one and one-fourth inch solder nipples.

DRINKING TROUGHS.

During the year one large bowl of the boiler pattern and one of Jencks' pattern were set to take the place of stone troughs removed and two of the boiler pattern erected in the following locations :

One in Randall square, boiler pattern. (Stone trough removed.)

One in east end of Exchange place, Jencks' pattern. (Stone trough removed.)

One south side of Point street, between Eddy street and bridge.

One junction of Branch avenue and Charles street.

There are now twenty-nine drinking troughs of the boiler pattern, six stone drinking troughs, six small iron drinking troughs, and one of Jencks' pattern : making the total number in use December 31, 1879, forty-two ; twelve of which are supplied with drinking cups.

DRINKING FOUNTAINS.

A drinking fountain has been attached to lamp post on the

south-west side of Randall square, and a drinking cup attached to the lamp post on drinking trough in Basin street.

The whole number of drinking fountains attached to lamp posts is sixteen.

The following table shows the material used tapping the mains and running three feet of pipe for private supply pipes, connecting services to mains where private supply pipes were abandoned by the extension of mains, and for repairs on services :

SIZE. INCHES.	Repairs and connecting Service Pipes to Mains.				Tapping and Pipe for private Supply Pipes.	
	Number of Taps.	Number of Stops.	Length of Tin Lined Lead Pipe.	Length of Common Lead Pipe.	Number of Taps.	Length of Common Lead Pipe.
$\frac{1}{8}$	6	5	.....	.....	.....	.....
$\frac{1}{4}$	2	2	28.6	.....	2	.....
$\frac{3}{8}$	1	.....	17.3	18.5	21	6
$\frac{1}{2}$	.....	.....	.....	.....	8	63
1	2	1	2.8	.....	1	24.3
1 $\frac{1}{2}$	.....	.....	1.4	5.5	.....	10.0

Five service boxes have been set to replace broken ones; twenty-two used for elevator supplies and blow-offs; and thirty-four set over taps for private supplies. Eighteen one inch stops were used for blow-offs. Four hydrant heads were loaned to the Fire Department.

The above work is in charge of S. Horace Wheeler.

Schedule of materials for service pipe work, drinking troughs and fountains, on hand January 1, 1880 :

FOR SERVICE PIPE WORK.

1 set of patterns and core boxes, complete, for $\frac{1}{2}$ inch tap and stop, $\frac{3}{4}$ inch tap and stop and 1 inch tap and stop.

330 small service boxes.

26 large service boxes.

211 lbs. tin.

514 lbs. solder.

700 lbs. scrap lead.

Taps, stops, plugs and lead pipe of the following sizes :

SIZE. INCHES.	TAPS.	STOPS.	PLUGS.	TIN LINED LEAD PIPE.	COMMON LEAD PIPE.
				FEET.	FEET.
$\frac{1}{8}$	2,676	2,715	26	.....	117.5
$\frac{1}{4}$	299	218	23	448	2,303
$\frac{3}{8}$	77	88	3	300	14,676
$\frac{1}{2}$	15	21	7	312	12,844
1	9	16	12	.....	1,564
$1\frac{1}{4}$	.....	.....	.....	150	3,460
$1\frac{1}{2}$	.....	.....	.....	.....	334
Totals..	3,076	3,053	71	1,205	35,298.5

FOR DRINKING FOUNTAINS.

5 Zanes' self-closing faucets.

27 tops for same.

1 new cup, (Gorham Mfg. Co.'s).

1 Peck's self-closing faucet.

15 feet chain with extra links, rings, etc.

10 signs, "Please keep the cups out of bowls."

FOR SMALL DRINKING TROUGHS.

1 set of patterns for drinking trough inlets.

10 cast iron stands for small troughs.

4 short standards for small troughs.

1 bowl for small troughs.

FOR LARGE DRINKING TROUGHS.

2 boiler bottoms.
 8 lamp posts.
 4 stone troughs.
 8 lamp posts for same.

FOR PAINTING.

8 lbs. metallic paint.
 18 lbs. Hampden green paint.
 8 paint brushes.
 1 paint duster.
 2 paint cans.
 1 one gallon oil can.
 1 one-half gallon oil can.

MISCELLANEOUS STOCK.

1 iron mould for rubber packing for tapping machine.
 8 hydrant heads.
 About 25 baskets charcoal.
 12½ lbs. tarred marline.
 1 lamp post clamp.
 61 lbs. tin tubing.
 25 lbs. lead tubing.

The following table shows the quantity of service stops, taps and lead pipe used for service pipe work the past year, the quantity on hand January 1, 1880, and the estimated amount that will be required for the coming year :

SIZE. INCHES.	QUANTITY USED THE PAST YEAR.			QUANTITY ON HAND, JANUARY 1, 1880.			QUANTITY REQUIRED FOR COMING YEAR.		
	Taps.	Stops.	Plugs.	Taps.	Stops.	Plugs.	Taps.	Stops.	Plugs.
½.....	101	109	.....	2,676	2,715	26	.....	.....	.....
¾.....	335	380	5	299	213	23	100	200	.....
1.....	57	60	5	77	88	3	.....	.....	5
1½.....	17	17	3	15	21	7	12	12	.....
2.....	9	9	.....	9	16	12	10	.....	.....
Totals..	519	575	13	3,076	3,053	71	122	212	5
Lead pipe, about 19½ tons.				About 18½ tons.			About 5 tons.		
Service boxes, 572.				{ Large, 26. Small, 300.					

METER DEPARTMENT.

The following table shows the new meters set, those set on trial, and those taken out after being condemned as useless on account of various causes, during the year 1879 :

MAKE.	NEW METERS SET.						SET ON TRIAL.			CONDEMNED AND TAKEN OUT.				
	SIZE IN INCHES.					Totals.	SIZE IN INCHES.		Totals.	SIZE IN INCHES.				Totals.
	¾	¾	1	1½	3		¾	¾		¾	1	1½		
Ball & Fitts, piston.....	322	53	4	.....	.....	379	.....	.....	.....	2	1	1	4	
Ball & Fitts, rotary.....	.....	...	10	7	1	18	4	1	5	.....	.....	.....	.....	.....
Wells.....	.....	.....	.....	.....	.....	.....	1	.....	1	.....	.....	.....	.....	.....
Totals....	322	53	14	7	1	397	5	1	6	2	1	1	4	

In addition to the above, the number of cases where meters were examined is 34 ; where disconnected, tested and reset, is 5 ; where taken out, re-set and changed for various purposes, is 144 ; where Ball & Fitts meters were disconnected, repaired and re-set, is 454 ; where Worthington meters were disconnected, repaired and re-set, is 91. The repairs on the above mentioned meters, (except in a few cases when castings, etc. were obtained from the manufacturers,) were made by the department. The number of cases where Fales, Jenks & Sons' meters were taken out, repaired, with a very few exceptions by the manufacturers, and re-set, is 403.

Eighty of the meters included in the above were disconnected in the latter part of the year 1878.

The above work is in charge of Edward A. Moran.

Schedule of meters and material for setting and repairing meters, etc., on hand January 1, 1880:

METERS OF THE FOLLOWING MAKES AND SIZES.

	$\frac{1}{2}$ inch.	$\frac{3}{4}$ inch.	1 inch.	2 inch.
Ball & Fitts, piston.....	4	10	2	.....
Fales, Jenks & Sons'.....	.....	.....	.....	4

FITTINGS, ETC., FOR BALL & FITTS METERS.

8 $\frac{1}{2}$ -inch connections.	6 1-inch piston connections.
20 $\frac{3}{4}$ -inch connections.	88 spindle gears.
5 1-inch connections.	55 brass nuts.
8 $1\frac{1}{2}$ -inch connections.	80 gears for crank shafts.
5 2-inch connections.	93 cranks.
4 3-inch connections, with flanges.	17 crank rolls.
2 4-inch connections, with flanges.	48 $\frac{1}{2}$ -inch shafts.
88 $\frac{1}{2}$ -inch heads and linings.	21 $\frac{3}{4}$ -inch shafts.
47 $\frac{3}{4}$ -inch heads and linings.	7 1-inch shafts.
100 $\frac{1}{2}$ -inch packings.	17 1-inch cranks.
50 $\frac{3}{4}$ -inch packings.	8 1-inch gears.
24 1-inch packings.	20 1-inch rolls.
171 clock gears.	14 $\frac{1}{2}$ -inch yokes.
8 $\frac{1}{2}$ -inch piston connections.	14 $\frac{3}{4}$ -inch yokes.
12 $\frac{3}{4}$ -inch piston connections.	9 1-inch yokes.

FITTINGS, ETC., FOR FALES, JENKS & SONS' METERS.

14 $\frac{1}{2}$ -inch connections.	4 2-inch couplings.
18 $\frac{3}{4}$ -inch connections.	48 couplings and nuts.
4 1-inch connections.	4 1-inch nuts.
51 1-inch couplings.	40 clamps.
4 $1\frac{1}{2}$ -inch couplings.	

MISCELLANEOUS STOCK.

25 feet of lead pipe.	4 $\frac{3}{4}$ x $\frac{1}{2}$ -inch galvanized couplings.
40 feet of $\frac{1}{2}$ -inch iron pipe.	60 iron bolts and nuts.
100 iron nipples.	200 old iron fittings.
16 meter couplings.	1 2-inch gate.
7 $\frac{3}{4}$ x $\frac{1}{2}$ -inch galvanized elbows.	6 old brass unions.

30 lbs. of rubber packing.	40 packings for stuffing boxes.
20 lbs. of cop waste.	7 meter dials.
8 feet $\frac{1}{2}$ -inch iron pipe.	1 lb. copper wire.
6 feet $\frac{1}{4}$ -inch brass pipe.	30 candles.
20 brass washers.	4 meter books.
400 leather washers.	30 lbs. of scrap brass.
1 2-inch brass connection.	30 lbs. of scrap iron.
1 1-inch stop cock.	3 lbs. brass wire.
10 meter screws.	20 baskets charcoal.
10 old iron unions.	1000 lbs. of iron (old).
2 8-inch gates.	100 lbs. of scrap lead.
33 lbs. of solder.	

The following statement shows the new meters set during the year, the number on hand January 1, 1880, and the estimated amount required for the coming year :

Size. Inches.	Set during the Year.	Balance on hand, Jan. 1, 1880.	Required for the Coming Year.
$\frac{1}{2}$	322	4	350
$\frac{3}{4}$	53	10	60
1	14	2	9
1 $\frac{1}{2}$	7	.....	6
2 .....	.....	4	2
3	1	.....	1
4 .....	.....	.....	1

In addition to the above, sundry small iron fittings, lead pipe, solder, new heads and other parts of Union meters for repairs, meter packings, candles, sealing wax, oil, paint, etc., will be required.

Table showing the rainfall at Pettaconset Pumping Station during the year 1879:

Day of Month.	Jan.	Feb.	Mar.	Apr'l.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.								.02				
2.	.36											
3.				.12		1.27	.25	.19	2.33		.53	
4.						.06						
5.		.26	.24			.61					.15	.78
6.				.04			.70	.45	.76			
7.												
8.	1.15	.06	.12		1.56							
9.					.13	.63						.86
10.		1.03	.03			.04	.74			.11		.17
11.											.15	
12.				.27				.25	.35			1.25
13.					.30	.26	.73					6.7
14.	1.48				.46		1.39		.07			
15.		.31	.66	2.90	.64		.02	5.50			.79	
16.										.22		.14
17.	.30	1.00	.28		.06						.44	
18.												
19.		.06	1.18							.56	.12	.50
20.		.26				.04		.52				.80
21.		.41					1.37					
22.			1.90		.08							
23.				.88		.37	.06			.21	1.04	
24.			.50									
25.			.60									.28
26.												
27.												
28.												
29.												
30.												
31.												
Totals....	3.26	3.39	5.68	5.93	1.49	3.65	4.55	6.93	3.51	1.10	3.27	4.35

Total fall for the year was 47.11 inches.

Table showing the rainfall at Sockanosset Reservoir during the year 1879:

Day of Month.	Jan.	Feb.	Mar.	Apr'l.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.								.06				
2.	.60											
3.				.11		1.67	.25	.22	2.23		.50	
4.						.04						
5.		.37	.25			.41						
6.				.04			.60	.46	.58			.83
7.												
8.	1.66	.12										
9.			.06	1.66		.73						.86
10.		2.16		.13		.07	.79			.15		.11
11.											.15	
12.			.22					.20	.30			1.58
13.					.33	.30	.47					
14.	1.20				.41		1.52					
15.		.60	.62	3.58	.64			5.50			1.10	.68
16.		.06	.50							.24	.42	
17.			.27		.06							
18.		.10	1.33							.66	.15	.50
19.												
20.								.13				.97
21.		.31					1.38	.54				
22.		.41			.09							
23.			2.12							.28	.93	
24.				1.02		.33	.06					
25.			.53									
26.			.19									.89
27.												
28.												
29.												
30.												
31.												
Totals...	3.44	4.57	5.58	6.89	1.49	3.72	4.63	6.97	3.33	1.33	3.25	4.99

Total fall for the year was 50.10 inches.

Table showing the Rainfall at Hope Reservoir during the year 1879:

Day of Month.	Jan.	Feb.	Mar.	Apr'l.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1								.19				
2	.40											
3				.20		1.64	.12	.18	1.56		.45	
4						.81						.10
5		.60										
6			.70			.46					.16	.70
7							.64	.35	.49			
8												
9	1.51											
10				1.64		1.03			.10			
11		2.40				.03	.66			.16		.20
12											.19	
13												
14			.28					.55	.46			1.20
15				.40	.40	.18			.07			.10
16	1.51				.03		.86					
17		.50	.58	2.20	.84		.21	4.40			.26	.75
18												.10
19		.40			.02						.39	
20			.11									.61
21			1.62						.06	.40	.20	
22												
23									.19			.70
24		.50				.06		.39				
25		.40		.12			1.57					
26			1.46		.15						.29	
27												.75
28				1.02		.35	.08					
29			.51									.42
30			1.10									
31												
Totals...	3.42	4.80	6.36	5.58	1.53	3.74	4.94	6.06	2.92	1.20	2.80	4.13

Total fall for the year was 47.57 inches.

Table showing the rainfall at Pipe Yard during the year 1879:

Day of Month.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1								.06				
2	.50											
3				.17		1.51	.06	.10	2.14		.53	
4						.86						.03
5		.20				.54						
6			.32								.13	.65
7							.50	.37	.51			
8												
9	1.45	.08	.08								.02	
10			.10			.74			.10			.17
11		1.50		1.42		.13				.00		
12						.06	.67				.14	
13			.25					.05	.39			1.38
14				.29	.36	.22						.12
15	.90						.87		.06			
16		.30	.62	2.42		.85	.33	3.38		.22	.64	.07
17		.06			.04						.42	
18			.24									.63
19			1.23						.03	.44	.13	
20									.10			.72
21		.30				.05		.38				
22		.68		.07			1.70					
23			1.47		.14							
24										.31		
25			.42	.86		.27	.06				.76	
26												
27			2.15									.52
Totals...	2.93	3.46	6.88	5.35	1.39	3.39	5.05	5.24	3.33	1.06	2.77	4.19

Total fall for the year was 45.04 inches.

The following table shows the temperature of both the water and atmosphere at one o'clock, P. M., at Hope Reservoir each day during the year 1879:

Day of Mo.	January.		February.		March.		April.		May.		June.		July.		August.		September.		October.		November.		December.	
	Wat'r	Atm's	Wat'r	Atm's	Wat'r	Atm's	Wat'r	Atm's	Wat'r	Atm's	Wat'r	Atm's	Wat'r	Atm's	Wat'r	Atm's	Wat'r	Atm's	Wat'r	Atm's	Wat'r	Atm's	Wat'r	Atm's
1	36	32	38	28	40	32	42	38	56	58	74	91	75	73	82	85	75	80	86	82	82	43	42	40
2	36	32	38	26	42	36	42	44	56	56	74	89	75	61	82	89	74	84	88	77	82	43	42	40
3	36	32	38	34	42	36	42	48	54	54	71	85	78	90	82	90	76	84	88	80	82	43	43	40
4	36	32	38	33	42	44	40	30	55	54	70	85	78	90	82	86	74	75	88	80	80	42	43	53
5	36	32	38	34	43	46	41	32	56	56	70	76	75	71	82	86	73	73	88	73	80	43	44	57
6	38	22	38	38	42	26	42	41	60	60	70	77	72	71	80	85	72	70	86	80	80	35	43	48
7	38	23	38	38	41	28	41	53	58	62	66	66	72	70	79	85	72	74	86	80	80	32	44	48
8	38	36	38	36	43	34	41	53	58	66	66	66	72	70	79	85	72	74	86	80	80	43	44	55
9	38	36	38	36	43	32	43	46	60	60	66	66	72	70	79	85	72	74	86	80	80	43	44	55
10	38	36	38	34	42	38	44	46	60	62	66	66	72	70	79	85	72	74	86	80	80	44	44	41
11	38	36	38	37	21	44	60	44	62	64	70	73	74	83	74	71	70	69	86	83	80	44	44	40
12	38	36	38	46	44	42	44	43	64	72	70	73	75	77	74	78	71	69	86	83	80	46	40	60
13	38	36	38	40	48	44	44	44	64	72	70	73	75	77	74	78	71	69	86	83	80	46	40	60
14	38	36	38	40	53	43	44	44	64	72	70	73	75	77	74	78	71	69	86	83	80	46	40	60
15	38	36	38	40	53	43	44	44	64	72	70	73	75	77	74	78	71	69	86	83	80	46	40	60
16	38	36	38	40	53	43	44	44	64	72	70	73	75	77	74	78	71	69	86	83	80	46	40	60
17	38	36	38	40	53	43	44	44	64	72	70	73	75	77	74	78	71	69	86	83	80	46	40	60
18	38	36	38	40	53	43	44	44	64	72	70	73	75	77	74	78	71	69	86	83	80	46	40	60
19	38	36	38	40	53	43	44	44	64	72	70	73	75	77	74	78	71	69	86	83	80	46	40	60
20	38	36	38	40	53	43	44	44	64	72	70	73	75	77	74	78	71	69	86	83	80	46	40	60
21	38	36	38	40	53	43	44	44	64	72	70	73	75	77	74	78	71	69	86	83	80	46	40	60
22	38	36	38	40	53	43	44	44	64	72	70	73	75	77	74	78	71	69	86	83	80	46	40	60
23	38	36	38	40	53	43	44	44	64	72	70	73	75	77	74	78	71	69	86	83	80	46	40	60
24	38	36	38	40	53	43	44	44	64	72	70	73	75	77	74	78	71	69	86	83	80	46	40	60
25	38	36	38	40	53	43	44	44	64	72	70	73	75	77	74	78	71	69	86	83	80	46	40	60
26	38	36	38	40	53	43	44	44	64	72	70	73	75	77	74	78	71	69	86	83	80	46	40	60
27	38	36	38	40	53	43	44	44	64	72	70	73	75	77	74	78	71	69	86	83	80	46	40	60
28	38	36	38	40	53	43	44	44	64	72	70	73	75	77	74	78	71	69	86	83	80	46	40	60
29	38	36	38	40	53	43	44	44	64	72	70	73	75	77	74	78	71	69	86	83	80	46	40	60
30	38	36	38	40	53	43	44	44	64	72	70	73	75	77	74	78	71	69	86	83	80	46	40	60
31	38	36	38	40	53	43	44	44	64	72	70	73	75	77	74	78	71	69	86	83	80	46	40	60

The following table shows the maximum and minimum temperatures at 7 A. M., at Hope Reservoir during the year 1879 :

MONTH.	Maximum.	Minimum.
January.....	38	4
February.....	46	10
March.....	40	15
April.....	56	24
May.....	70	43
June.....	76	53
July.....	80	60
August.....	82	57
September.....	73	40
October.....	68	28
November.....	60	12
December.....	57	8

Prevailing direction of the wind during the day time at Hope Reservoir, during the year 1879 :

Day of Month.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.....	S. W.	N. W.	S.	N. W.	N. W.	S. W.	N.	S. W.	S.	N. W.	N. W.	S. W.
2.....	N. E. & S. W.	N.	N. E.	N. W.	N. W.	S. W.	N. W.	S. W.	S. W.	S.	S.	S.
3.....	W.	N. W.	N. E.	S. W.	N. W.	N. E.	S. W.	W.	S.	W.	S. E.	S. E.
4.....	W.	N. W.	S. W.	N. W.	S. W.	S. W.	S. W.	S. W.	S. E.	N. W.	N. W.	W.
5.....	W.	S. W.	N. W.	N. W.	S. W.	S. W.	N. E.	S. W.	N. W.	S. W.	N. W.	E.
6.....	N. W.	N.	S. E.	N. W.	S. E.	S. W.	S.	N. W.	N. W.	N. E.	N.	E.
7.....	N. W.	N. W.	N. W.	W.	N. W.	N. W.	S. W.	N. W.	S.	S. W.	N. W.	N. W.
8.....	S. W.	N. W.	N. E.	N. W.	N. E.	N. W.	S. W.	N. E.	S. W.	W.	S. W.	N. W.
9.....	S. E. & N. E.	S. W.	S.	N. W.	N. E.	S. W.	N. W.	N. W.	N. W.	N. E.	S. W.	N. E.
10.....	N. W.	N. W.	S.	E.	S.	S. E.	N.	N. W.	N.	N. E.	N. W.	S. E.
11.....	S. W.	S. W.	S.	N.	S.	S.	N. E.	N. W.	N.	N. E.	S. W.	S. W.
12.....	N. W.	W.	N. W.	N. W.	S. W.	E.	N. E.	S. W.	S. W.	S.	W.	N. W.
13.....	S. W.	N. W.	S. W.	W.	S. W.	N.	S.	S. W.	S. W.	N.	N. E.	N. E.
14.....	N. W.	N. W.	S. E.	N. W.	S. W.	W.	S. W.	S. W.	S. W.	N. W.	S.	E.
15.....	N. W.	N. W.	N. W.	S. E.	S.	E.	W.	S. E.	S. W.	N. W.	S. W.	W.
16.....	N. E.	S. W.	S. W.	N. E.	S. E.	N. E.	S. W.	E.	E.	N. W.	N. W.	N. W.
17.....	N. W.	N. E.	E.	N. E.	N. E.	N. W.	N. W.	N. E.	W.	S. E.	W.	N. W.
18.....	W.	N. W.	N. W.	N. E.	E.	N.	S. W.	N.	S. W.	S. E.	N. E.	N. W.
19.....	N. W.	N. E.	N. W.	N. E.	E.	E.	N. E.	N. W.	N.	N. W.	N.	N. E.
20.....	N. W.	N. E.	S. W.	N. W.	S. W.	S.	S. W.	N. W.	S. W.	N. W.	N. W.	N. W.
21.....	N. W.	N. W.	N. E.	N. W.	S. W.	S. E.	S. W.	S. W.	N. E.	S. W.	N. W.	N.
22.....	N. W.	N. W.	S. E.	N.	N. E.	S. W.	S. W.	S. W.	N. E.	S.	S. W.	N.
23.....	W.	S.	N. W.	N. W.	E.	N. W.	S. W.	S. W.	S. W.	S. W.	S. W.	S. W.
24.....	N. W.	N. W.	S. E.	N. E.	N.	S.	N. E.	S. W.	S. W.	N. W.	W.	N. W.
25.....	N. W.	S. E.	N. E.	S.	S. W.	S. E.	N. E.	E.	N. W.	N. W.	S. W.	N. W.
26.....	N. W.	S.	N. E.	N. E.	N.	S. W.	N. E.	N. W.	N. W.	S. W.	N. W.	N. W.
27.....	S. W.	N. W.	S. E.	S. E.	S. W.	S.	S. W.	N. E.	S. E.	S.	S.	S. W.
28.....	S. W.	N. E.	N. E.	S.	N.	S. W.	N. W.	N. E.	S. W.	E.	S.	S. W.
29.....	N. W.	.....	N. E.	S.	S.	S. E.	S. E.	S. W.	N. W.	N. W.	N. W.	S. W.
30.....	N. W.	.....	N. W.	.....	S.	N. W.	S. W.	N. E.	W.	N.	N. W.	N. W.
31.....	N. W.	.....	N. E.	.....	S. W.	.....	S. E.	N. W.	.....	N. W.	.....	N. E.

The following table shows the average, maximum and minimum elevations of the Pawtuxet river at Pettaconset during the year 1879 :

MONTHS.	AVERAGE ELEVATIONS.				MAXIMUM ELEVATIONS.			MINIMUM ELEVATIONS.		
	MONTHLY.			Daily.	Date.	Time.	Elevat'n.	Date.	Time.	Elevat'n.
	7 A.M.	12 M.	5 P.M.							
January.....	9.35	9.92	9.66	9.64	17	12 M.	11.24	27	7 A. M.	8.90
February.....	9.70	10.14	9.57	9.80	13	7 A. M.	16.52	9	5 P. M.	8.55
March.....	9.76	10.09	9.93	9.93	28	5 P. M.	12.90	9	7 A. M. & 12 M.	9.00
April.....	10.39	10.78	10.54	10.57	19	12 M.	14.30	29	7 A. M.	9.20
May.....	9.02	9.54	9.37	9.31	1	12 M.	10.60	31	7 A. M.	8.67
June.....	8.47	9.13	9.00	8.90	5	12 M.	9.62	19	7 A. M.	8.05
July.....	8.19	8.98	8.97	8.71	18	12 M.	9.38	13	7 A. M.	7.22
August.....	8.41	9.10	9.07	8.86	19	5 P. M.	11.17	15	7 A. M.	6.80
September.....	8.24	8.96	9.00	8.74	15	12 M.	9.35	29	7 A. M.	7.90
October.....	8.04	8.83	8.79	8.55	3	5 P. M.	9.30	20	7 A. M.	7.80
November.....	8.04	8.76	8.79	8.53	18	5 P. M.	9.02	3	7 A. M.	7.80
December.....	8.36	9.09	9.09	8.86	27	12 M.	9.86	1	7 A. M.	8.00
For the year	8.83	9.46	9.32	9.20	Feb. 13	7 A. M.	16.52	July 13.	7 A. M.	7.22

The monthly and total and the average daily and monthly consumption of water, including waste and leakage, in gallons, during the year 1879, is shown by the following table :

MONTHS.	Consumption per Month.	Average Monthly Consumption.	Average Daily Consumption per Month.	Average Daily Consumption for the Year.
January.....	87,588,549	.....	2,825,437	.....
February.....	82,076,187	.....	2,931,292	.....
March.....	80,170,759	.....	2,586,154	.....
April.....	71,519,960	.....	2,383,999	.....
May.....	99,961,224	.....	3,224,556	.....
June.....	104,398,522	.....	3,479,951	.....
July.....	117,254,110	.....	3,782,891	.....
August.....	109,254,290	.....	3,524,382	.....
September.....	99,589,910	.....	3,319,664	.....
October.....	104,655,907	.....	3,375,997	.....
November.....	86,828,572	.....	2,894,286	.....
December.....	91,958,889	.....	2,966,254	.....
Total.....	1,185,251,879	94,604,323	.....	3,110,279

The method of ascertaining the quantity of water by which meters have been tested during the past year, by weighing, has proved to be an accurate and expeditious way and has saved much valuable time.

All meters, whether new or repaired, are tested before being set, and are rejected if there is an error in their register of more than two per cent.

In compliance to your requests, estimates for laying about 36,000 feet of water pipe have been made, at an estimate cost of about \$40,697.00.

Plans and estimates have also been made relative to a supply of water for East Providence and the State Farm.

A table has been calculated containing the static head in feet, and the pressure in pounds, of 1,103 fire hydrants, which has proved to be valuable to the water department, as well as to the fire department.

The bridge over the mains at the Pochasset river on Reservoir avenue, and the bridge over the mains at the Pontiac road, have each been re-planked; the former by and at the expense of the town of Cranston and the latter by and at the expense of the Providence Water Works.

The culvert under the mains just north of the Pontiac road, which settled some soon after it was built in 1870, has been examined from year to year, but shows no signs of settling during the last three years. The mains at that point have also been exposed and examined and no signs of any movement can be seen.

Since the work of piling in connection with the foundation of the Cornish engine has been completed, the engine runs smoothly and, so far, gives no cause for fear as to the

permanent effects of the repairs made. Much credit is due Mr. Horatio L. Briggs, Superintendent at Pettaconset, for the energy with which he pushed forward the repairs, and for the constant care exercised at all times during the progress of the work.

His Honor the Mayor, in his inaugural address to the City Council of 1880, has so fully and correctly stated the need of another pumping engine at Pettaconset that I might not be expected to speak of the subject; but I deem it my duty to call your attention to the matter, feeling, as I do, that another engine of equal or greater capacity than the Cornish should be contracted for at an early day.

In addition to the regular work much miscellaneous work has been done in connection with the water department.

The cost of engineering for the work connected with the Water Works during the year was \$2,617.33. The force employed consisted of Edmund B. Weston, Engineer in charge, George B. Francis and Franklin I. Fuller, assistants, together with John E. Bowen and Irving S. Wood, who have devoted only a part of the time to Water Works and a part to other work.

SEWERS.

The following table shows the locations, sizes and length of sewers constructed during the year :

STREET.	ORDERED.		COM- PLETED.	Brick		Pipe.		Totals.
	Res. No.	Date.		18 inch.	15 inch.	12 inch.		
Maple and Plain streets, from Beacon street to South street.....	508	Dec. 30, 1878	May 2, 1879	.....	.....	497.00	497.00	
Barclay street, from summit, 160 feet to Atwell's avenue.....	125	Mar. 15, 1879	May 8, 1879	.....	.....	192.20	192.20	
Eddy street, from the entrance to R. I. Hospital grounds about 100 feet to present sewer.....	169	Apr. 15, 1879	June 20, 1879	.....	.....	103.32	103.32	
America street, from summit near Asia street to Broadway.....	168	Apr. 15, 1879	June 16, 1879	59.00	259.25	453.25	771.50	
Total length, in feet.....	.....	.....	.....	59.00	259.25	1245.77	1564.02	
Total length, in miles.....	.....	.....	.....	.....	.....	.....	0.296	

Nineteen man-holes have been built during the past year, making the total number of man-holes, January 1, 1880, twenty-three hundred and thirty-three.

Five catch-basins have been built and connected with sewers constructed during the year.

Two catch-basins were built in Olive street, between Brown and Thayer streets, the street having been brought to grade and curbed.

Two catch-basins were built to accommodate a repaving of the street, as follows :

- 1 at the corner of Oliver street and High street.
- 1 on west side of Cove street, between Fountain and Sabin streets.

Twelve catch basins were built to trap old drains, as follows :

- 1 opposite 22 South Main street.
- 1 on north-east corner South Main street and Planet street.
- 1 on south-east corner South Main street and Planet street.
- 1 on north-east corner South Main street and Power street.

- 1 on south-east corner South Main street and Power street.
- 1 on north-east corner South Main street and Williams street.
- 1 on south-east corner South Main street and Williams street.
- 1 on north-east corner South Main street and James street.
- 1 on south-east corner South Main street and James street.
- 1 on north-east corner South Main street and Transit street.
- 1 on south-east corner South Main street and Transit street.
- 1 on north corner Meadow street and Lockwood street, built as ordered by the City Council under Resolution No. 545, approved November 18, 1878.

The total number of catch-basins built during the year was twenty-one, making the whole number built to January 1, 1880, seventeen hundred and twenty-four.

Two hundred and six private connections have been made with the sewers, making the total number to January 1, 1880, twenty-seven hundred and seventy-two.

Seventeen old sewer inlets on South Main street have been trapped, viz. :

- 1 opposite 23 South Main street.
- 1 at north-west corner Hopkins street and South Main street.
- 1 at south-east corner Hopkins street and South Main street.
- 1 at south-west corner Crawford street and South Main street.
- 1 opposite Crawford street on South Main street.
- 1 at south-west corner Ward street and South Main street.
- 1 opposite Ward street on South Main street.
- 1 south-west corner Planet street and South Main street.
- 1 south-east corner Planet street and South Main street.
- 1 at Hose Company, No. 2, east side South Main street.
- 1 at north-west corner Williams street and South Main street.
- 1 at north-east corner Williams street and South Main street.
- 1 at north-west corner James street and South Main street.
- 1 at north-east corner James street and South Main street.
- 1 at south-west corner James street and South Main street.
- 1 at north-west corner Transit street and South Main street.
- 1 at north-east corner Transit street and South Main street.

It was desirable to trap these inlets in as inexpensive a manner as possible, without interfering with the present arrangement of paving, as the prospective widening of South Main street would probably do away with the inlets in their present location. For these reasons "Clapp's Inlet and

Trap," a grated inlet with a flap valve trap suspended below it, was used. The frames of the inlets were let into the man-hole of the old stone covering, where there was but one stone, or set on brick work, where the old covering was made of several pieces. As a trap they have worked satisfactorily.

The work done under authority of Resolution 313, approved July 21st, 1879, connecting old drains in Church, Bowen and Thomas streets with the North Main street sewer, has abated a long felt and trying nuisance.

The following is a statement of the total lengths of each size of sewer constructed to January 1st, 1880 :

SIZE.—INCHES.	KIND.	Constructed previous to 1879.	Constructed in 1879.	Totals.
66x72.....	Brick	530.64.....		530.64
40x60.....	"	2,354.46.....		2,354.46
38x57.....	"	2,891.15.....		2,891.15
36x54.....	"	3,095.33.....		3,095.33
34x51.....	"	594.50.....		594.50
32x48.....	"	410.85.....		410.85
30x45.....	"	2,916.13.....		2,916.13
28x42.....	"	3,789.78.....		3,789.78
26x39.....	"	1,602.15.....		1,602.15
24x36.....	"	4,719.15.....		4,719.15
22x33.....	"	5,040.01.....		5,040.01
20x30.....	"	6,244.76.....		6,244.76
18x26.....	"	142.00.....		142.00
16x24.....	"	482.00.....		482.00
66.....	"	4,025.55.....		4,025.55
54.....	"	250.00.....		250.00
48.....	"	1,707.72.....		1,707.72
40.....	"	568.25.....		568.25
36.....	"	195.80.....		195.80
30.....	"	849.17.....		849.17
24.....	"	1,929.00.....		1,929.00
22.....	"	7,624.44.....		7,624.44
20.....	"	9,679.27.....		9,679.27
18.....	"	10,587.92.....	59.00	10,646.92
16.....	"	4,059.06.....		4,059.06
18.....	Pipe	1,128.26.....		1,128.26
15.....	"	19,840.15.....	259.25	20,099.40
12.....	"	128,291.70.....	1,245.77	129,537.47
8.....	"	219.30.....		219.30
Total length, in feet.....		225,268.50	1,564.02	226,832.52
Total length, in miles.....		42.664	0.296	42.960

Schedule of sewer material received and delivered during the year, also the balance on hand January 1, 1880, at the pipe yard :

MATERIAL.		On hand, January 1, 1879.	Received from street or trans- ferred.	Rejected, worthless, or trans- ferred.	Received during the year.	Delivered during the year.	On hand, January 1, 1880.
KIND.	Size. Inches.	Pieces.	Pieces.	Pieces.	Pieces.	Pieces.	Pieces.
Straight pipe, sec'ds	18	93	2	.....	.....	.....	95
Branch " sec'da	18x12	6	.....	.....	.....	.....	6
" " firsts.	18x6	44	.....	.....	.....	.....	44
Straight " firsts.	15	59	28	.....	91	60	118
" " sec'da	15	.....	.....	.....	44	.....	44
Branch " firsts.	15x6	63	7	.....	1	23	46
" " sec'da	15x6	.....	.....	.....	3	.....	3
Straight " firsts.	12	1,234	.....	4	425	355	1,309
" " sec'da	12	.....	17	.....	646	364	286
Branch " firsts.	12x12	40	.....	.....	.....	12	28
" " sec'da	12x12	16	11	.....	.....	.....	27
" " Y...	12x12	26	.....	.....	.....	.....	26
" " firsts.	12x6	180	72	.....	64	96	218
" " sec'da	12x6	293	.....	7	47	4	329
Curved pipe.....	12	119	3	.....	.....	14	106
Bevel connections, firsts.....	12	70	1	.....	.....	2	69
Bevel connections, seconds.....	12	9	2	3	.....	.....	8
Straight pipe, 1 foot long.....	6	350	.....	.....	.....	1	349
Straight pipe, 2 feet long.....	6	104	.....	5	.....	107	52
Straight pipe, 3 feet long.....	6	3	.....	1	.....	.....	2
Branch pipe.....	6x6	120	.....	.....	.....	.....	120
Curved pipe.....	6	63	.....	2	.....	9	52
Long bevel connec- tions.....	6	777	.....	606	.....	.....	171
Short bevel connec- tions.....	6	605	603	.....	.....	32	1,176
Invert blocks.....	8	1,969	.....	.....	.....	.....	1,969
" ".....	4	1,408	.....	.....	.....	.....	1,408
Man-hole inverts, curved.....	.....	16	.....	.....	.....	.....	16
straight.....	12	187	.....	.....	.....	.....	187
branch.....	12x12	9	.....	.....	.....	1	8
Lamp-hole inverts, curved.....	12	408	.....	.....	.....	.....	408
Man-hole frames.....	.....	384	15	.....	.....	26	373
" covers.....	.....	341	155	.....	.....	144	352

MATERIAL.		On hand, January 1, 1879.	Received from street, or trans- ferred.	Rejected, worthless, or trans- ferred.	Received during the year.	Delivered during the year.	On hand, January 1, 1880.
KIND.	Size. Inches.	Pieces.	Pieces.	Pieces.	Pieces.	Pieces.	Pieces.
Man hole covers, new style.....		41	.....	.....	100	141	.....
Lamp-hole frames and covers.....		86	.....	.....	.....	.....	86
Catch-basin traps..		222	.....	1	.....	19	202
" ".....		6	.....	.....	50	28	28
Catch-basin covers..		177	.....	3	.....	31	143
Large grated covers		17	.....	2	.....	.....	15
Small grated covers		12	.....	.....	.....	1	11
Sewer inlets.....		9	.....	.....	.....	.....	9
Straight brick.....		565,886	19,865	546,021
Swelled brick.....		224,750	29,300	195,450
Flag stone.....		116	3	7	.....	21	91
Basin traps, Clapp's patent.....		4	.....	2	18	18	2
Grated sewer inlets, Clapp's patent...		7	.....	3	3	5	2
Large basin covers, Clapp's patent...		1	.....	.....	.....	.....	1
Catch-basin traps, old style.....		29	27	.....	.....	.....	56
Catch-basin covers.. old style.....		56	.....	.....	.....	56
AT CITY YARD.							
Corn'r coping stones		56	1	.....	.....	2	55
Corner gutter stones		68	.....	1	.....	2	65
Square cop'ng stones		46	.....	.....	.....	19	27
Square gutt'r stones rights.....		26	.....	.....	.....	10	16
" ".....		34	.....	.....	.....	8	26
" ".....		1	.....	.....	.....	1	.....

MAINTENANCE.

The following tables show the work done during the year cleaning old drains, basins and sand catchers, and new sewers and basins :

OLD WORK.

MONTHS.	OLD DRAINS.			SAND CATCHERS.		BASINS.		
	Number.	Length. Feet.	Deposit Re. moved. Cubic Feet.	Number.	Deposit Re. moved. Cubic Feet.	Number.	Deposit Re. moved. Cubic Feet.	Total Amount Deposit Re. moved. Cubic Yards.
January.....								
February.....	1			1	225			8.3
March.....								
April.....				4	1,540	2	95	60.5
May.....	2	100	75					2.7
June.....						15	87	3.2
July.....	1	25	5	8	1,345	2	130	54.8
August.....								
September.....				1	102			7.3
October.....	3	160	450	14	3,340	8	121	144.8
November.....	1	155	200					7.4
December.....								
Totals.....	7	440	730	28	6,642	27	433	280.

NEW WORK.—SEWERS CLEANED.

MONTHS.	Number Cleaned.	Length Cleaned in Feet.	Deposit Removed. Cubic Feet.	Deposit Removed. Cubic Yds.	Dead Ends Cleaned.	Deposit Removed. Cubic Feet.
January.....	4	2,100	2,929	108.4		
February.....	4	3,300	3,825	141.6		
March.....						
April.....	7	3,405	310	11.4		
May.....	4	1,450	686	25.4		
June.....	3	90	255	9.4		
July.....	8	1,265	130	4.8		
August.....	3	70	90	3.3		
September.....	36	14,500	82	3.		
October.....	3	900	10	.3		
November.....	34	25,100	163	6.	75	15
December.....	34	15,930	381	14.1	99	5
Totals.....	140	66,110	8,861	328.1	175	20

REPORT OF THE WATER COMMISSIONERS.

61

BASINS CLEANED AND FILLED.

MONTHS.	Number Cleaned.	Deposit Removed. Cubic Feet.	Basins Filled from Hydrants.	Basins Filled by Rain or Melt'd Snow	Untrapped Basins Filled.	Deposit Removed. Cubic Yds.
January.....	295	4,679	272	23	40	173.3
February.....	77	2,352	37	40	.....	87.1
March.....	139	3,672	13	126	.....	136.
April.....	292	6,190	214	78	.....	229.2
May.....	438	7,825	421	17	.....	289.8
June.....	293	6,413	255	38	.....	237.8
July.....	414	9,967	397	17	.....	368.5
August.....	928	21,553	907	21	.....	798.2
September.....	920	15,442	920	.....	.....	571.9
October.....	309	3,588	306	3	1,078	132.8
November.....	208	2,315	188	20	2	85.7
December.....	248	3,544	215	33	.....	131.2
Totals....	4,561	87,530	4,145	416	1,120	3,241.8

SUMMARY.

NEW WORK.	CLEANED.		FILLED.			SEWERS.			DEAD ENDS		
	Total Number.	Deposit Re- moved. Cubic Yards.	From Hydrants.	By Rain or Snow.	For being Un- trapped.	Number Cleaned.	Length. Miles.	Deposit Re- moved. Cubic Yards.	Number Cleaned.	Deposit Re- moved. Cubic Yards.	Total Deposit Re- moved during Year. Cubic Yards.
Catch-basins.....	4,561	3241.8	4,145	416	1,120	.....	.....	.....	.....	.....	.....
Sewers.....	.....	.....	.....	.....	.....	140	12.7	338.1	175	.70	3570.6
OLD WORK.											
Sand-catchers.....	28	246.	.....	.....	.....	.....	.....	.....	.....	.....	.....
Basins.....	27	16.	.....	.....	.....	.....	.....	.....	.....	.....	.....
Sewers.....	.....	.....	.....	.....	.....	7	.06	27.	.....	.....	289.
Totals.....	4,616	3503.8	4,145	416	1,120	147	12.76	355.1	175	.70	3869.6

REPAIRS ON NEW WORK.

- 5 basin chutes built.
- 16 man-hole frames raised or lowered.
- 4 catch-basins cemented to prevent leaking.
- 1 old style basin-trap changed.
- 5 holes at catch-basins repaired.
- 46 holes over sewers repaired.
- 2 streets over sewers surfaced.
- 1 trap-bed repaired.
- 2 gutter-stones raised or lowered.
- 129 man-hole covers changed.
- 5 lantern-hole frames lowered.
- 1 section of the Blackstone street sewer pointed.
- 2 wooden basin covers fitted.
- 8 basin covers changed.
- 1 man-hole frame changed.
- 2 broken "Clapp gratings" changed.
- 67 repairs of concrete around catch-basins.

OLD WORK.

- 4 old drains repaired.
- 1 examination of old catchers.
- 18 holes repaired.
- 1 sand catcher repaired.
- 1 stone man-hole frame removed.
- 2 man-hole frames replaced.
- 11 broken "Clapp gratings" repaired.

Although the first cost of the construction of barn and other buildings, together with that of horses and carts bought during the year, has added considerably to the cost of this department for 1879, yet the change made,—that of owning and board of teams,—has already proved a great saving in the expenses of the regular work.

This department, on account of its having more than ordinary facilities, is constantly called upon to do work, not only for other departments of the city, but much work for private parties, such as pumping out cellars, filling cisterns, cleaning private connections with the sewers, etc., the cost of which

comes from the appropriation for sewer maintenance, while the money received for the same goes into the city treasury, instead of being credited to the department.

Early in the spring it was found that the sewer in Elm street, between Eddy street and the harbor line, had settled considerably, especially near the outlet, where within a space of forty feet it had settled sufficient to break the sewer square off in four places. The displacement at the break nearest the dock wall was about seven and one-half inches vertically, while the part of the sewer built into the wall, including the outlet stones, remained as originally set. About forty feet of this sewer was taken up and rebuilt on a platform with brick haunches, and is now in good condition.

In the annual examination of the sewers extensive cracks were discovered in the brick work of that portion of Pearl street sewer lying between Plane and Broad streets.

These cracks occur in the top of the arch and the bottom of the invert, being open in some cases about half an inch. A portion of the work has been repaired and the remainder is now being done.

The force employed has been Otis F. Clapp, engineer in charge of sewer department, Edwin P. Dawley and Leprilete Sweet, principals, and George Alexander and Frederick R. Arnold, assistants. The cost of engineering for the sewer department from January 1st to December 31st, 1879, was \$7,264.29.

SAMUEL M. GRAY,

City Engineer and Supt. Water Works and Sewers.

